

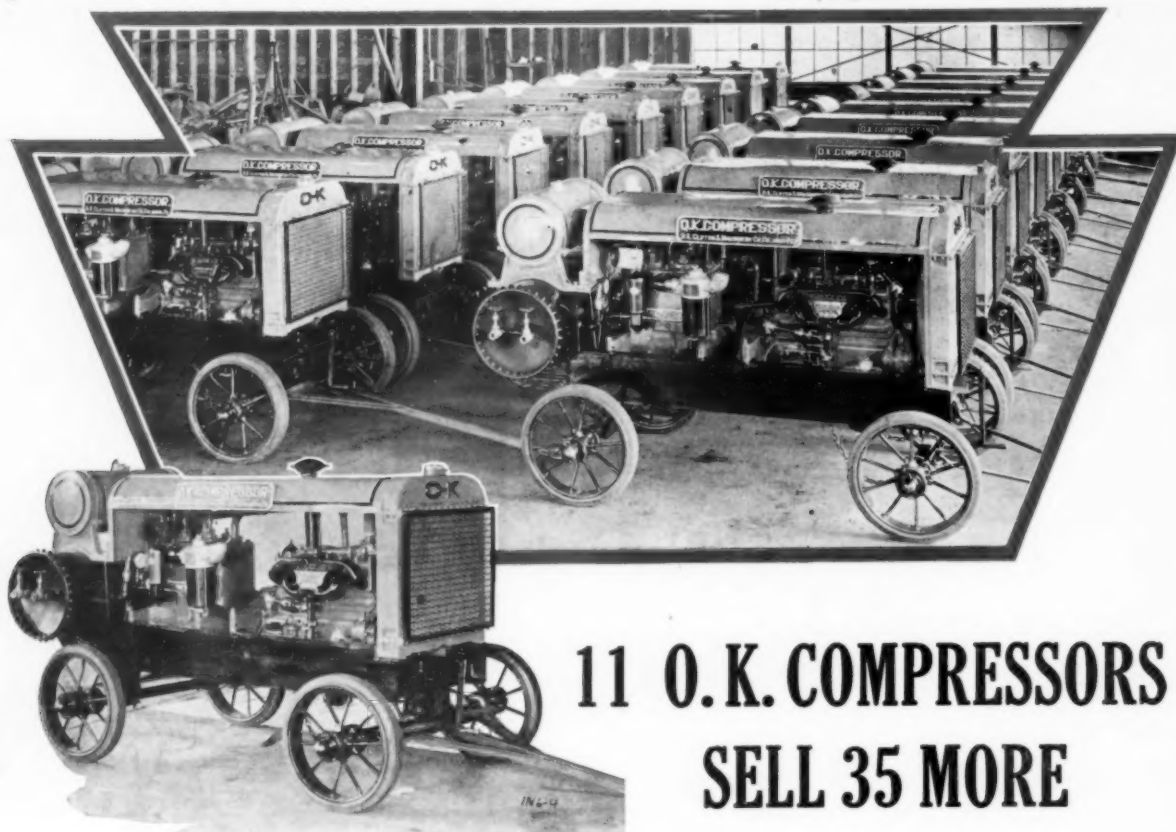
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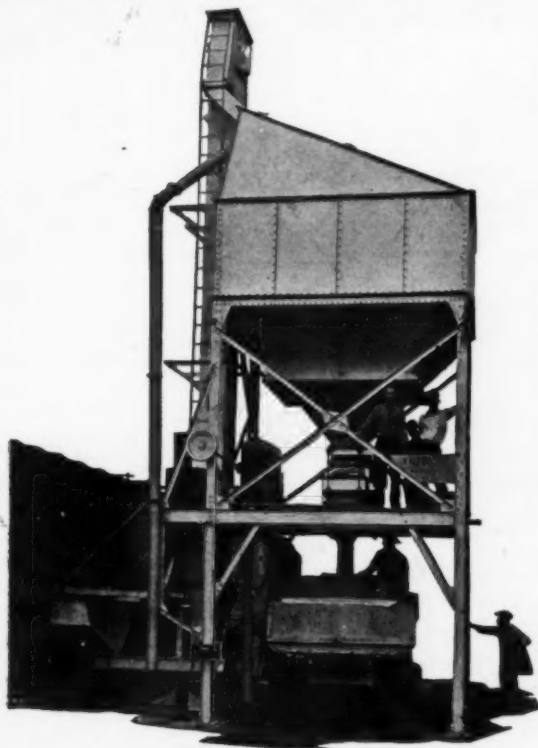
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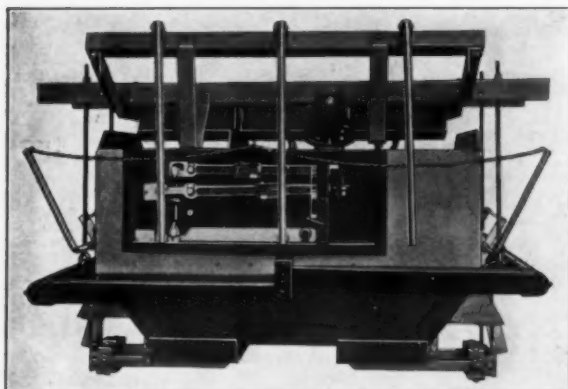
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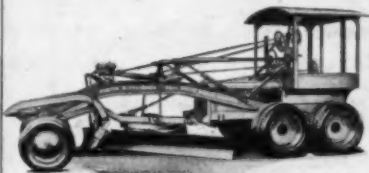
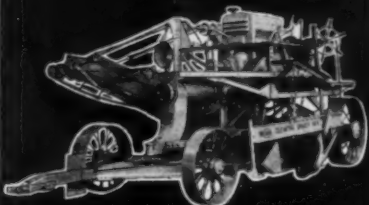
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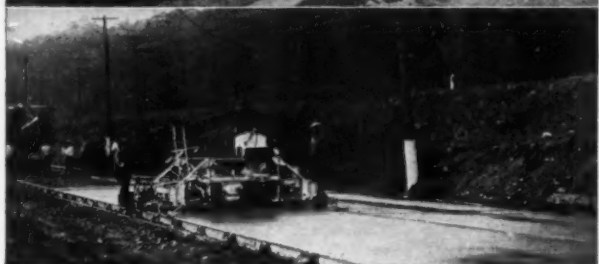
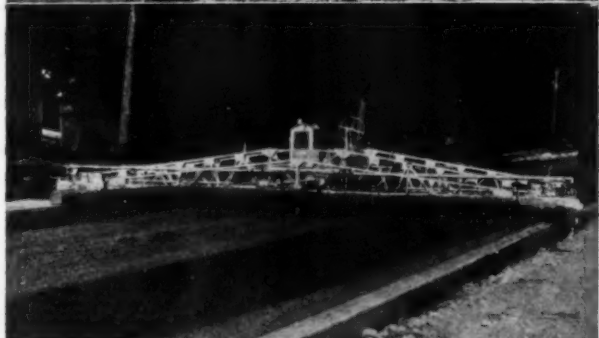
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- Colorado P. C. Co., Denver, Colo.
- Consolidated Cement Corp., Chicago
- Cowell P. C. Co., Cowell, Cal.
- Crescent P. C. Co., Wampum, Pa.
- Dewey P. C. Co., Kansas City, Mo.
- Diamond P. C. Co., Cleveland, Ohio
- Edison P. C. Co., New York
- Georgia Cement & Stone Co., Birmingham, Ala.
- Giant P. C. Co., Philadelphia
- Glens Falls P. C. Co., Glens Falls, N. Y.
- Golden State P. C. Co., Los Angeles, Cal.
- Great Western P. C. Co., Kansas City, Mo.
- Hawkeye P. C. Co., Des Moines, Iowa
- Hercules Cement Corp., Philadelphia
- Hermite P. C. Co., Nashville, Tenn.
- Huron P. C. Co., Detroit, Mich.
- International Cement Corp., New York
- International P. C. Co., Ltd., Spokane, Wash.
- Kosmos P. C. Co., Louisville, Ky.
- La Tolteca Compania de Cemento Portland, Mexico City, Mex.
- Lawrence Cement Co., New York
- Lehigh P. C. Co., Allentown, Pa.
- Louisville Cement Co., Louisville, Ky.
- Manitowoc P. C. Co., Manitowoc, Wis.
- Marlboro Cement Co., Edmonton, Can.
- Marquette Cement Mfg. Co., Chicago
- Medusa Portland Cement Co., Cleveland, O.
- Missouri P. C. Co., St. Louis, Mo.
- Monarch Cement Co., Humboldt, Kans.
- Monolith P. C. Co., Los Angeles, Cal.
- National Cement Co., Birmingham, Ala.
- Nazareth Cement Co., Nazareth, Pa.
- Nebraska Cement Co., Denver, Colo.
- Newago P. C. Co., Newago, Mich.
- New Egyptian P. C. Co., Detroit, Mich.
- North Amer. Cement Corp., Albany, N. Y.
- Northwestern States P. C. Co., Mason City, Ia.
- Oklahoma P. C. Co., Denver, Colo.
- Olympic P. C. Co., Ltd., Seattle, Wash.
- Oregon P. C. Co., Portland, Ore.
- Pacific P. C. Co., San Francisco, Calif.
- Peerless P. C. Co., Detroit, Mich.
- Peninsular P. C. Co., Cement City, Mich.
- Penn-Allen Cement Co., Nazareth, Pa.
- Pennsylvania-Dixie Cement Corp., New York
- Potosky P. C. Co., Potosky, Mich.
- Phoenix P. C. Co., Philadelphia
- P. C. Co. of Utah, Salt Lake City, Utah
- Pyramid P. C. Co., Des Moines, Iowa
- Riverside P. C. Co., Los Angeles, Calif.
- St. Marys Cement Co., Toronto, Can.
- San Antonio P. C. Co., San Antonio, Texas
- Santa Cruz P. C. Co., San Francisco, Calif.
- Signal Mountain P. C. Co., Chattanooga, Tenn.
- Southern States P. C. Co., Rockport, Ga.
- Southwestern P. C. Co., Los Angeles, Cal.
- Standard P. C. Co., Cleveland, Ohio
- San P. C. Co., Portland, Ore.
- Superior P. C. Co., Seattle, Wash.



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Cement (Cont.)

Three Forks P. O. Co., Denver, Colo.
Tidewater P. O. Co., Baltimore, Md.
Trinity P. O. Co., Dallas, Tex.
Union P. O. Co., Denver, Colo.
U. S. P. O. Co., Denver, Colo.
Utah Idaho Cement Co., Ogden, Utah
Vulcanite P. O. Co., Philadelphia
Wabash P. O. Co., Detroit, Mich.
Warrior Cement Corp., Chattanooga, Tenn.
Wellston Iron Furnace Co., Jackson, Ohio
Wolverine P. O. Co., Goldwater, Mich.
Wyandotte P. O. Co., Detroit, Mich.

Cement Handling Equipment, Bulk

*Blaw-Knox Co., Pittsburgh, Pa.
*Butler Bin Co., Waukesha, Wis.
*Hetsel Stl. Form & Ir. Co., Warren, Ohio
Barber-Greene Co., Aurora, Ill.
Diamond Iron Works, Minneapolis, Minn.
Fuller Co., Catsanqua, Pa.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Harm Co., George O., Warren, Ohio
Johnson Co., C. S., Champaign, Ill.
Richardson Scale Co., Clifton, N. J.
Stephens-Adams Mfg. Co., Aurora, Ill.
Warren Bros. Roads Co., Boston, Mass.

Cement, Quick-Hardening

*Universal Atlas Cement Co., Chicago (Alumina)
Glens Falls Portland Cement Co., Glens Falls, N. Y. (Portland)
International Cement Corp., New York (Portland)

Cement Tools

Abrams Cement Tool Co., Detroit, Mich.

Centrifugal Pumps (See Pumps)

Chains, Block

American Chain Co., Bridgeport, Conn.
Baldwin Chain & Mfg. Co., Worcester, Mass.
Chain Belt Co., Milwaukee, Wis.
Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Co., Columbus, Ohio
Link-Belt Co., Chicago
U. S. Chain & Forge Co., Pittsburgh, Pa.
Webster & Weller Mfg. Co.'s, Chicago

Chains, Power Transmission

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chain Belt Co., Milwaukee, Wis.
Diamond Iron Works, Minneapolis, Minn.
Dodge Mfg. Corp., Mishawaka, Ind.
Haiss Mfg. Co., Geo., New York
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Chicago
Morse Chain Co., Ithaca, N. Y.
Stephens-Adams Mfg. Co., Aurora, Ill.
Webster & Weller Mfg. Co.'s, Chicago
Whitney Mfg. Co., Hartford, Conn.

Check Valves (See Valves)

Chimneys, Concrete

Heine Chimney Co., Chicago
Kellogg & Co., M. W., Jersey City, N. J.
Rust Engg. Co., Pittsburgh, Pa.
Weber Chimney Co., Chicago

Chimneys, Radial Brick

American Chimney Corp., New York
Continental Chimney Co. of Chicago, Chicago
Custodia Alphonse Chimney Const. Co., New York
Heine Chimney Co., Chicago
Heinicke, Inc., H. E., Indianapolis, Ind.
Kellogg & Co., M. W., Jersey City, N. J.
Northwestern Chimney Const. Co., Cleveland, O.
Rust Engineering Co., Pittsburgh, Pa.
Weber Chimney Co., Chicago

Chimneys, Steel

*Blaw-Knox Co., Pittsburgh, Pa.
*Connery & Co., Inc., Philadelphia
*Hetsel Steel Form & Iron Co., Warren, O.
*Littleford Bros., Cincinnati, Ohio
Birmingham Tank Co., Birmingham, Ala.
Chattanooga Boiler & Tank Co., Chattanooga, Tenn.
Chicago Bridge & Iron Wks., Chicago
Edwards Mfg. Co., Cincinnati, Ohio
Graver Tank & Mfg. Co., E. Chicago, Ind.
Honhorst Co., Jos., Cincinnati, Ohio
Koven & Bro., L. O., Jersey City, N. J.
Lancaster Iron Works, Lancaster, Pa.
New York Central Iron Works, Inc., Hagerstown, Md.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Tippett & Wood, Phillipsburg, N. J.

Chip Spreaders (Spreaders)

Chisels, Chipping

Cleveland Steel Tool Co., Cleveland, Ohio
Dallett Co., Philadelphia
Verona Tool Works, Verona, Pa.

Chlorinators

Paradon Mfg. Co., Arlington, N. J.
Wallace & Tiernan Co., Inc., Newark, N. J.

Chlorine, Liquid

Arnold, Hoffman & Co., Inc., New York
Diamond Alkali Co., Pittsburgh, Pa.
Electro Bleaching Gas Co., New York
Hooker Electrochemical Co., New York
Mathieson Alkali Works, Inc., New York
Pennsylvania Salt Mfg. Co., Philadelphia

Chutes and Towers, Concrete

*Jaeger Machine Co., Columbus, Ohio
*Lakewood Engg. Co., Columbus, Ohio
*Ransome Conc. Machy. Co., Dunellen, N. J.
Archer Iron Works, Chicago, Ill.
Insley Mfg. Co., Indianapolis, Ind.
Lansing Co., Lansing, Mich.

Clamshell Buckets (See Buckets)

Clamps and Ties, Form

*Kuhlman & Co., W. A., Toledo, Ohio
Batavia Clamp Co., Batavia, N. Y.
Black Bros. Co., Mendota, Ill.
Concrete Form-Hold Co., Culver City, Calif.
Concrete Form Tie Corp., Pittsburgh, Pa.
Everett & Co., R. B., Houston, Texas
Ezy-Set Wall Tie Co., Dayton, Ohio
Insley Mfg. Co., Indianapolis, Ind.
M. & M. Wire Clamp Co., Minneapolis, Minn.
Richmond Screw Anchor Co., Inc., Brooklyn, N. Y.
Taylor Mfg. Co., James L., Poughkeepsie, N.Y.
Union Steel Products Co., Albion, Mich.
Universal Form Clamp Co., Chicago
Wedgit Tie Co., Inc., New York

Clamps, Column

Black Bros. Co., Mendota, Ill.
Concrete Engg. Co., Omaha, Neb.
Handy Mfg. Co., Chicago
Insley Mfg. Co., Indianapolis, Ind.
Kardong Bros., Inc., Minneapolis, Minn.
M. & M. Wire Clamp Co., Minneapolis, Minn.
O. D. G. Co., The, Owensboro, Ky.
Red Star Prods. Corp., Cleveland, Ohio
Ross Co., H. W., Cincinnati, Ohio
Steelform Contracting Co., San Francisco, Calif.
Sterling Wheelbarrow Co., Milwaukee, Wis.
Symons Clamp & Mfg. Co., Chicago
Taylor Mfg. Co., James L., Poughkeepsie, N.Y.
Universal Form Clamp Co., Chicago

Clay Pipe (See Pipe)

Clips, Wire Rope

*American Steel & Wire Co., Chicago
American Hoist & Derrick Co., St. Paul, Minn.
Fischer & Hayes Rope & Steel Co., Chicago
Hazard Wire Rope Co., Wilkes-Barre, Pa.
Laughlin Co., Thos., Portland, Maine
Leechen & Sons Rope Co., St. Louis
Marion Malleable Iron Wks., Marion, Ind.
Mockbee Co., C. M., Cincinnati, Ohio
Upson-Walton Co., Cleveland, Ohio
Wilcox-Crittenden & Co., Inc., Middletown, Conn.

Clutches

*O. K. Clutch & Machy. Co., Columbia, Pa.
Beach Mfg. Co., Charlotte, Mich.
Brown Clutch Co., Sandusky, Ohio
Brown-Lipe Gear Co., Syracuse, N. Y.
Link-Belt Co., Chicago
Moore-Master Mfg. Co., Chicago
Twin Disc Clutch Co., Racine, Wis.

Cocks, Curb and Corporation

Chapman Valve Mfg. Co., Indian Orchard, Mass.
Glauber Brass Mfg. Co., Cleveland, Ohio
Haydenville Co., Haydenville, Mass.
Hays Mfg. Co., Erie, Pa.
Mueller Co., Decatur, Ill.
Union Water Meter Co., Worcester, Mass.

Column Clamps (See Clamps)

Compounds, Sewer Joint

*Servicised Products Corp., Chicago
*Standard Oil Co. of Indiana, Chicago
Atlas Mineral Products Co., Merststown, Pa.
Dixon Crucible Co., Jos., Jersey City, N. J.
Leadite Co., The, Philadelphia
Pacific Flush Tank Co., Chicago and New York
Prestite Engg. Co., St. Louis, Mo.
Ric-wil Co., Cleveland, Ohio
Ruberoid Co., New York

Compressors, Air, Portable

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Homelite Corp., Port Chester, N. Y.
*Nove Engine Co., Lansing, Mich.
*O. K. Clutch & Machy. Co., Columbia, Pa.
*Schramm, Inc., West Chester, Pa.
*Sterling Machy. Corp., Kansas City, Mo.
*Worthington Pump & Machy. Corp., Harrison, N. J.

Aeme Rd. Machy. Co., Frankfort, N. Y.
Buhl Co., Chicago, Ill.
Chicago Pneumatic Tool Co., New York
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Davey Compressor Co., Kent, Ohio
Gardner-Denver Co., Quincy, Ill.
Independent Pneu. Tool Co., Chicago
Ingersoll-Rand Co., New York
National Brake & Elec. Co., Milwaukee, Wis.
Pasche Air Brush Co., Chicago, Ill.
Pennsylvania Pump & Comp. Co., Easton, Pa.
Pontiac Tractor Co., Pontiac, Mich.
Sullivan Machinery Co., Chicago
Yeomans Bros. Co., Chicago

Compressors, Air, Stationary

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Nove Engine Co., Lansing, Mich.
*Schramm, Inc., West Chester, Pa.
*Worthington Pump & Machy. Corp., Harrison, N. J.
Buhl Co., Chicago, Ill.
Chicago Pneumatic Tool Co., New York
Cooper-Bessemer Corp., Mt. Vernon, Ohio
Curtis Pneumatic Machy. Co., St. Louis, Mo.
DeLaval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., Chicago
Gardner-Denver Co., Quincy, Ill.
General Electric Co., Schenectady, N. Y.
Hardie-Tynes Mfg. Co., Birmingham, Ala.
Hobart Bros. Co., Troy, Ohio
Indiana Pump & Comp. Co., Indianapolis, Ind.
National Brake & Elec. Co., Milwaukee, Wis.
Independent Pneu. Tool Co., Chicago
Ingersoll-Rand Co., New York
Nordberg Mfg. Co., Milwaukee, Wis.
Pennsylvania Pump & Comp. Co., Easton, Pa.
Sullivan Machinery Co., Chicago
Wayne Co., Ft. Wayne, Ind.
Westinghouse Trac. Brake Co., Wilmerding, Pa.
Yeomans Bros. Co., Chicago

Concrete Agitator Bodies (See Bodies)

Concrete Breakers (See Tools, Pneumatic)

Concrete Carts (See Carts)

Concrete Block Machines (See Block Machines)

Concrete Chimneys (See Chimneys)

Concrete Chutes (See Chutes)

Concrete Curing (See Calcium Chloride; Asphalt for Curing Concrete; Silicate of Soda; Paper)

Concrete Manhole Forms (See Forms)

Concrete Mixer Bodies (See Bodies)

Concrete Mixers (See Mixers)

Concrete Pavers (See Pavers)

Concrete Piles (See Piles)

Concrete Pipe (See Pipe)

Concrete Pipe Forms (See Forms)

Concrete Placers, Pneumatic (See Placers)

Concrete Placing Plants

*Jaeger Machine Co., Columbus, Ohio
*Lakewood Engg. Co., Columbus, Ohio
*Ransome Conc. Machinery Co., Dunellen, N. J.
Archer Iron Works, Chicago
Insley Mfg. Co., Indianapolis, Ind.

Concrete Reinforcing (See Steel, Reinforcing; Wire Fabric, Reinforcing)

Concrete Road Finishers (See Finishers)

Concrete Road Forms (See Forms)

Conduits, Underground

Evans & Howard Fire Brick Co., St. Louis, Mo.
Fibre Conduit Co., Orangeburg, N. Y.
National Fireproofing Co., New York
Ric-wil Co., Cleveland, Ohio
Wyckoff Pipe & Creosoting Co., New York

Convertible Shovels (See Shovels)



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Conveyors, Belt

*Austin-Western Rd. Machy. Co., Chicago
 *Diamond Iron Works, Inc., Minneapolis, Minn.
 *Pioneer Gravel Equip. Mfg. Co., Minneapolis
 Atlas Engg. Co., Clintonville, Wis.
 Barber-Greene Co., Aurora, Ill.
 Bartlett & Snow Corp., C. O., Cleveland, O.
 Caldwell & Son, H. W., Chicago
 Chain Belt Co., Milwaukee, Wis.
 Chicago Automatic Conv. Co., Chicago
 Fairfield Engg. Co., Marion, Ohio
 Gifford-Wood Co., Hudson, N. Y.
 Good Roads Machy. Co., Kennett Square, Pa.
 Haisa Mfg. Co., Geo., New York
 Industrial Brownhoist Corp., Cleveland, O.
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Jeffrey Mfg. Co., Columbus, Ohio
 Lamson Co., Syracuse, N. Y.
 Link-Belt Co., Chicago
 Logan Co., Louisville, Ky.
 Mathews Conveyor Co., Ellwood City, Pa.
 New Holland Machine Co., New Holland, Pa.
 Northern Conveyor Co., Janesville, Wis.
 Olson & Co., Samuel, Chicago
 Robins Conveying Belt Co., New York
 Seaverns Co., Jas. B., Batavia, Ill.
 Smith Engg. Works, Milwaukee, Wis.
 Standard Conveyor Co., N. St. Paul, Minn.
 Stephens-Adamson Mfg. Co., Aurora, Ill.
 Universal Road Machy. Co., Kingston, N. Y.
 Webster & Weller Mfg. Co's, Chicago
 Weimer Co., H. W., Milwaukee, Wis.

Conveyors, Belt, Portable

*Austin-Western Rd. Machy. Co., Chicago
 *Burch Corp., The, Crestline, Ohio
 *Conveying Weigher Co., New York
 *Pioneer Gravel Equip. Mfg. Co., Minneapolis
 Atlas Engg. Co., Clintonville, Wis.
 Barber-Greene Co., Aurora, Ill.
 Chicago Automatic Conv. Co., Chicago
 Diamond Iron Works, Minneapolis, Minn.
 Fairfield Engg. Co., Marion, Ohio
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Gifford-Wood Co., Hudson, N. Y.
 Haisa Mfg. Co., Geo., New York
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Northern Conveyor Co., Janesville, Wis.
 Stephens-Adamson Mfg. Co., Aurora, Ill.
 Webster & Weller Mfg. Co's, Chicago
 Western Wheeled Scraper Co., Aurora, Ill.

Conveyors, Bucket, Portable

*Pioneer Gravel Equip. Mfg. Co., Minneapolis
 Atlas Engg. Co., Clintonville, Wis.
 Bartlett & Snow Co., C. O., Cleveland, Ohio
 Caldwell & Son, H. W., Chicago
 Chain Belt Co., Milwaukee, Wis.
 Chicago Automatic Conv. Co., Chicago
 Fairfield Engg. Co., Marion, Ohio
 Gifford-Wood Co., Hudson, N. Y.
 Godfrey Conveyor Co., Elkhart, Ind.
 Good Roads Machy. Co., Kennett Square, Pa.
 Haisa Mfg. Co., Geo., New York
 Industrial Brownhoist Corp., Cleveland, Ohio
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Jeffrey Mfg. Co., Columbus, Ohio
 Lamson Co., Syracuse, N. Y.
 Link-Belt Co., Chicago
 Mead-Morrison Mfg. Co., E. Boston, Mass.
 New England Rd. Machy. Co., E. Boston, Mass.
 New Holland Machine Co., New Holland, Pa.
 Spears-Wellis Machy. Co., Oakland, Calif.
 Stephens-Adamson Mfg. Co., Aurora, Ill.
 Universal Crusher Co., Cedar Rapids, Iowa

Conveyors, Gravity

Lamson Co., Syracuse, N. Y.
 Logan Co., Louisville, Ky.
 Mathews Conveyor Co., Ellwood City, Pa.
 Olson & Co., Samuel, Chicago
 Sprout, Waldron & Co., Muncy, Pa.

Core Drills (See Drills)

Corporation Cocks (See Cocks)

Corrugated Metal Culverts (See Culverts)

Cots (See Bunks and Cots)

Couplings, Hose, Air

*Continental Rubber Works, Erie, Pa.
 Allen Air Appliances Co., New York
 Chicago Pneum. Tool Co., New York
 Cleveland Pneum. Tool Co., Cleveland, Ohio
 Hunt & Sons, C. B., Salem, Ohio
 Independent Pneum. Tool Co., Chicago
 Ingersoll-Rand Co., New York
 Keller, Inc., W. H., Grand Rapids, Mich.
 Morton Mfg. Co., Muskegon Hgts., Mich.
 Mulconroy Co., Philadelphia

Couplings, Hose, Water

*Continental Rubber Works, Erie, Pa.
 Akron Brass Mfg. Co., Wooster, Ohio
 Chicago Pneumatic Tool Co., New York
 Dallett Co., Philadelphia
 Hunt & Son, C. B., Salem, Ohio
 Independent Pneum. Tool Co., Chicago
 Mulconroy Mfg. Co., Philadelphia
 U. S. Rubber Co., New York

Covering, Pipe

Aircell
 *Carey Co., Phillip, Cincinnati, Ohio
 Burnham Boiler Corp., Irvington, N. Y.
 Ehret Mag. Mfg. Co., Valley Forge, Pa.
 Johns-Manville, Inc., New York
 Keasby & Mattison Co., Ambler, Pa.
 National Asbestos Co., Jersey City, N. J.
 Norristown Mag. & Ash. Co., Norristown, Pa.
 Sall Mountain Co., Chicago

85 Per Cent Magnesite

*Carey Co., Phillip, Cincinnati, Ohio
 Burnham Boiler Corp., Irvington, N. Y.
 Ehret Mag. Mfg. Co., Valley Forge, Pa.
 Johns-Manville, Inc., New York
 Keasby & Mattison Co., Ambler, Pa.
 Norristown Mag. & Ash. Co., Norristown, Pa.

Wood

Redwood Mfrs. Co., San Francisco, Calif.
 Wyckoff & Sons Co., A., Elmira, N. Y.

Cranes, Crawler

*Bay City Shovel, Inc., Bay City, Mich.
 *General Excavator Co., Marion, Ohio
 *Keystone Driller Co., Beaver Falls, Pa.
 *National Equip. Corp., Milwaukee, Wis.
 *Ohio Locomotive Crane Co., Bucyrus, Ohio
 *Osgood Co., Marion, Ohio
 *Trackson Co., Milwaukee, Wis.
 American Hoist & Derrick Co., St. Paul, Minn.
 Browning Crane Co., Cleveland, Ohio
 Buckeye Traction Ditcher Co., Findlay, Ohio
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Byers Machine Co., Ravenna, Ohio
 Harnischfeger Corp., Milwaukee, Wis.
 Hughes-Keenan Co., Mansfield, Ohio
 Industrial Brownhoist Corp., Cleveland, Ohio
 Insoley Mfg. Co., Indianapolis, Ind.
 Link-Belt Co., Chicago
 Manitowoc Engg. Wks., Manitowoc, Wis.
 Marion Steam Shovel Co., Marion, Ohio
 Mead-Morrison Mfg. Co., E. Boston, Mass.
 Northwest Engg. Co., Chicago
 Ohio Power Shovel Co., Lima, Ohio
 Orton Crane & Shovel Co., Chicago
 Speeder Machy. Corp., Cedar Rapids, Iowa
 Star Drilling Machine Co., Akron, Ohio
 Thew Shovel Co., Lorain, Ohio
 Universal Crane Co., Lorain, Ohio
 W-K-M Company, Houston, Texas

Cranes, Locomotive

*Ohio Locomotive Crane Co., Bucyrus, Ohio
 *Osgood Co., Marion, Ohio
 American Hoist & Derrick Co., St. Paul, Minn.
 Browning Crane Co., Cleveland, Ohio
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Industrial Brownhoist Corp., Cleveland, Ohio
 Link-Belt Co., Chicago, Ill.
 Locomotive Crane Co. of Amer., Champaign, Ill.
 Northwest Engg. Co., Chicago
 Orton Crane & Shovel Co., Chicago
 Silent Hoist Winch & Crane Co., Bklyn., N. Y.
 Speeder Machy. Corp., Cedar Rapids, Iowa
 Thew Shovel Co., Lorain, Ohio

Cranes, One-Ton

*Nelson Iron Works, N. P., Passaic, N. J.
 *Trackson Co., Milwaukee, Wis.
 B & A Specialty Co., Tulsa, Okla.
 Baash-Ross Tool Co., Los Angeles, Calif.
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Clark Tractor Co., Battle Creek, Mich.
 Hughes-Keenan Co., Mansfield, Ohio
 Poor, Inc., Frederic H., New York
 Resistor Engg. Corp., Muskegon, Ohio
 Sterling Tractor Equip. Co., Brookly, N. Y.
 Terminal Engg. Co., New York
 Thaleg & Hock, Inc., Chicago
 Western Machine Co., Chicago
 Whitehead & Kales Co., Detroit, Mich.

Cranes, Truck

*Saggen Derrick Co., Chicago
 Bay City Fdy. & Mach. Co., Bay City, Mich.
 Browning Crane Co., Cleveland, Ohio
 Buckeye Traction Ditcher Co., Findlay, Ohio
 Harnischfeger Corp., Milwaukee, Wis.
 Mead-Morrison Mfg. Co., Boston, Mass.
 Orton Crane & Shovel Co., Chicago
 Universal Crane Co., Lorain, Ohio
 Willamette-Ersted Co., Portland, Ore.

Crawler Cranes (See Cranes)

Crawler Treads (See Treads)

Crescoted Wood (See Wood, Crescoted)

Crushers, Rock

*Allis-Chalmers Mfg. Co., Springfield, Ill.
 *Austin-Western Road Machy. Co., Chicago
 *Day Pulverizer Co., Knoxville, Tenn.
 *Pioneer Gravel Equip. Mfg. Co., Minneapolis
 Acme Rd. Machy. Co., Frankfort, N. Y.
 James H. Beane Fdy. Co., Martins Ferry, O.
 Buchanan Co., Inc., O. G., New York
 Diamond Iron Works, Minneapolis, Minn.
 Gallion Iron Wks. & Mfg. Co., Gallion, Ohio
 Good Roads Machy. Co., Kennett Square, Pa.
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Jeffrey Mfg. Co., Columbus, Ohio
 New England Road Machy. Co., E. Boston, Mass.
 New Holland Machine Co., New Holland, Pa.
 Nordberg Mfg. Co., Milwaukee, Wis.
 Rogers Iron Wks. Co., Joplin, Mo.
 Russell Grader Mfg. Co., Minneapolis, Minn.
 Smith Engg. Works, Milwaukee, Wis.
 Sturtevant Mill Co., Boston, Mass.
 Traylor Engg. & Mfg. Co., Allentown, Pa.
 United Iron Works, Kansas City, Mo.
 Universal Crusher Co., Cedar Rapids, Iowa
 Universal Road Machy. Co., Kingston, N. Y.
 Western Wheeled Scraper Co., Aurora, Ill.
 Wheeling Mould & Fdy. Co., Wheeling, W. Va.
 Williams Patent Crusher & Pulv. Co., St. Louis
 Wise Pulverizer Co., O. B., Knoxville, Tenn.

Crushing Plants, Portable

*Austin-Western Road Machy. Co., Chicago
 *Day Pulverizer Co., Knoxville, Tenn.
 *Pioneer Gravel Equip. Mfg. Co., Minneapolis
 Acme Rd. Machy. Co., Frankfort, N. Y.
 Good Roads Machy. Co., Kennett Square, Pa.
 Diamond Iron Works, Minneapolis, Minn.
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Smith Engg. Works, Milwaukee, Wis.
 Traylor Engg. & Mfg. Co., Allentown, Pa.
 Universal Road Machy. Co., Kingston, N. Y.
 Western Wheeled Scraper Co., Aurora, Ill.
 Williams Patent Crusher & Pulv. Co., St. Louis

Culvert Forms (See Forms)

Culverts, Cast Iron (See also Pipe, Cast Iron)

*Burch Corp., The, Crestline, Ohio
 *U. S. Pipe & Fdy. Co., Burlington, N. J.
 American Casting Co., Birmingham, Ala.
 Beach Mfg. Co., Charlotte, Mich.
 Gallion Iron Works & Mfg. Co., Gallion, Ohio

Culverts, Corrugated Metal

*Armco Culvert Mfrs. Assn., Middletown, O.
 *Austin-Western Road Machy. Co., Chicago
 *Gohl Culv. Mfrs. Inc., Newport, Ky.
 American Casting Co., Birmingham, Ala.
 Bark Riv. Bridge & Culv. Co., Bark Riv., Mich.
 Beach Mfg. Co., Charlotte, Mich.
 Beatrice Steel Tank Mfg. Co., Beatrice, Neb.
 Berger Mfg. Co., Jacksonville, Fla.
 Burnham Mfg. Co., Woods Creek, Utah
 Calif. Corr. Culv. Co., W. Berkeley, Calif.
 Canada Ingot Ir. Co., Ltd., Guelph, Ont.
 Canton Culv. Co., Canton, Ohio
 Denver Steel & Iron Wks., Denver, Colo.
 Dixie Culv. & Metal Co., Atlanta, Ga.
 Edwards Mfg. Co., Cincinnati, Ohio
 Gallion Iron Wks. & Mfg. Co., Gallion, Ohio
 Good Roads Machy. Co., Kennett Square, Pa.
 Hardesty Mfg. Co., E., Denver, Colo.
 Iowa Pure Iron Co., Des Moines, Iowa
 Kentucky Culv. Mfg. Co., Louisville, Ky.
 Lyle Culv. & Pipe Co., Minneapolis
 Maryland Culv. & Metal Co., Baltimore, Md.
 Nebraska Culv. & Mfg. Co., Wahoo, Neb.
 N. E. Metal Culv. Co., Palmer, Mass.
 Newport Culv. Co., Newport, Ky.
 Northfield Iron Co., Northfield, Minn.
 Northwestern Sheet & Ir. Wks., Wapeton, N.D.
 Ohio Corr. Culv. Co., Middletown, Ohio
 O'Neill Co., W. S., Crawfordville, Ind.
 Penn Metal Co., Boston, Mass.
 Pure Iron Culv. & Mfg. Co., Portland, Ore.
 Road Supply & Metal Co., Topeka, Kan.
 St. Paul Corr. Co., St. Paul, Minn.
 Sioux Falls Metal Culv. Co., Sioux Falls, S. D.
 So. Metal Culv. Co., Salisbury, N. C.
 Spokane Culv. & Tank Co., Spokane, Wash.
 Tennessee Metal Culv. Co., Nashville, Tenn.
 Toncan Culv. Mfrs. Assn., Massillon, Ohio
 Union Iron Prod. Co., E. Chicago, Ind.
 Western Metal Mfg. Co., Houston, Tex.
 Wheeling Corr. Co., Wheeling, W. Va.

Curb and Gutter Forms (See Forms)

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY

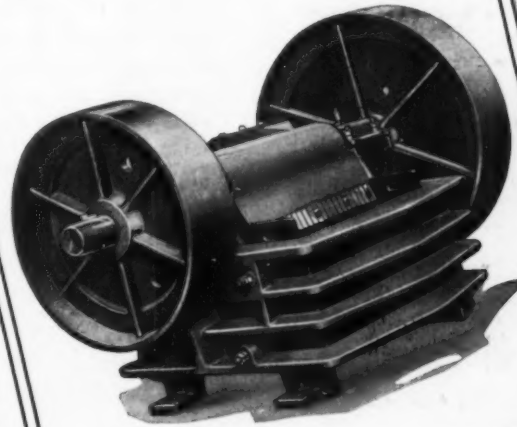
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PIONEER CRUSHERS

Greater Capacity

is the keynote of the new Pioneer Crusher. Simplicity of design, sturdy construction, and great strength are the prime characteristics which make this complete line of crushers measure up to the high standard always maintained in Pioneer Gravel Equipment. The force-feed crushing action of the Pioneer Crusher gives a forward and downward movement to the movable jaw and provides uniform crushing and greater capacity, a decided improvement over old methods. For portable plants, stationary plants or primary crushers, there is a Pioneer Crusher built to take care of most every crushing requirement.

Pioneer Jaw Crushers are made in the following sizes: 824, 836, 1224, 1236, 1524, and 1536. Size of jaw openings range from 8" x 24" to 15" x 36". Send for detailed information on Pioneer Jaw Crusher, also Pioneer 14 x 24 Roll Crusher.



Front view of Pioneer Jaw Crusher.



Rear view showing adjusting mechanism entirely enclosed—a new feature.

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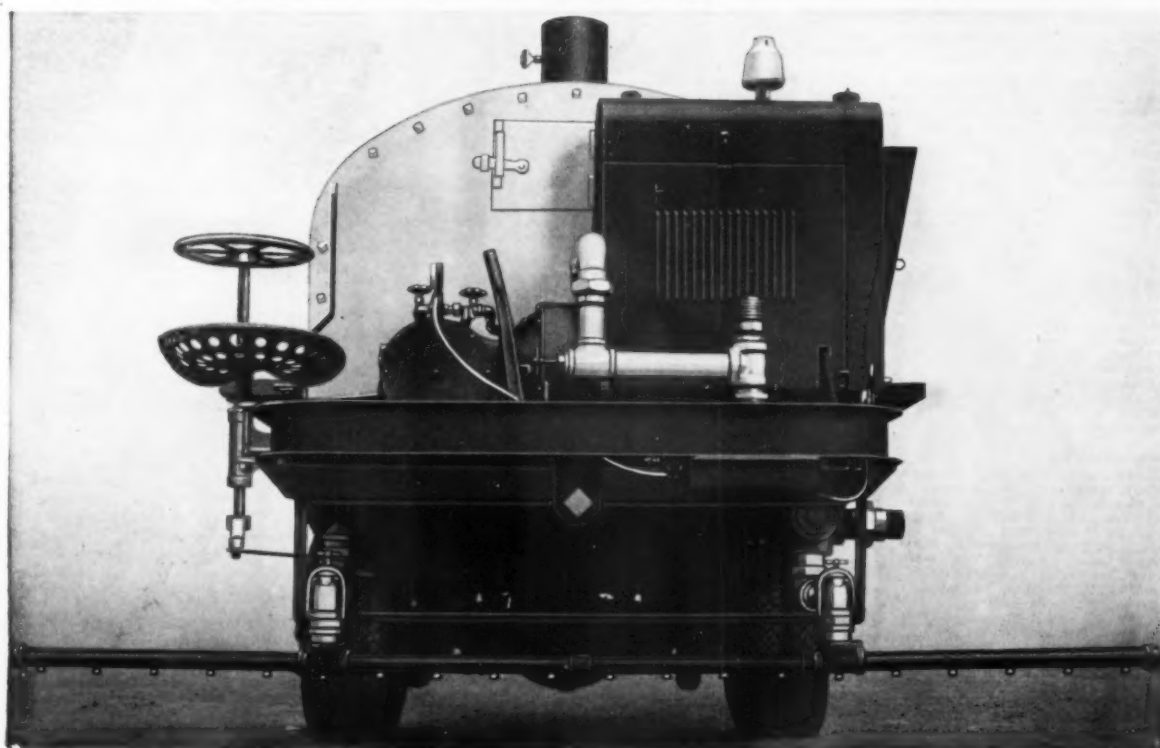
- Curb Cocks (See Cocks)**
- Curb Guards, Steel (See Guards)**
- Curing Concrete, Asphalt for (See Asphalt)**
- Cutters, Bar (See Banders and Cutters)**
- Cutters, Brush**
 *LaPlant-Chaste Mfg. Co., Inc., Cedar Rapids, Iowa
- Cutters, Pipe**
 *Hills & Ford Mfg. Co., Detroit, Mich.
 Armstrong Mfg. Co., Detroit, Mich.
 Barnes Tool Co., New Haven, Conn.
 Borden Co., Warren, Ohio
 Cook, Inc., A. D., Lawrenceburg, Ind.
 Erie Tool Works, Erie, Pa.
 Greenfield Tap & Die Corp., Greenfield, Mass.
 Oswego Tool Co., Oswego, N. Y.
 Reed Mfg. Co., Erie, Pa.
 Smith Mfg. Co., A. F., East Orange, N. J.
 Walworth Co., Boston, Mass.
- Cutters, Rod and Wire**
 Carolus Mfg. Co., Sterling, Ill.
 Helwig Mfg. Co., St. Paul, Minn.
 M. & M. Wire Clamp Co., Minneapolis, Minn.
 Morse-Starrett Prod. Co., Oakland, Calif.
- Cutting and Welding Apparatus (See Welding Apparatus)**
- Deep Well Pumps (See Pumps)**
- Derrick Fittings (See Fittings)**
- Derricks, Guy and Stiffleg**
 *Lidgerwood Mfg. Co., Elizabeth, N. J.
 *McKiernan-Terry Corp., New York
 *Sagen Derrick Co., Chicago
 American Hoist & Derrick Co., St. Paul, Minn.
 Clyde Iron Wks. Sales Co., Duluth, Minn.
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Flory Mfg. Co., Bangor, Pa.
 Mundy Hoisting Eng. Co., J. S., Newark, N. J.
 Street Bros. Mach. Wks., Chattanooga, Tenn.
- Derricks, Pipe-Laying**
 *Sagen Derrick Co., Chicago
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Street Bros. Mach. Wks., Chattanooga, Tenn.
 Taylor Port. Steel Der. Co., Chicago
 W-K-M Co., Houston, Texas
- Derricks, Revolving**
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Lakeside Bridge & Steel Co., No. Milwaukee
 Street Bros. Mach. Wks., Chattanooga, Tenn.
- Derricks, Steel**
 *Hayward Co., New York
 *Lidgerwood Mfg. Co., Elizabeth, N. J.
 *McKiernan-Terry Corp., New York
 *Sagen Derrick Co., Chicago
 American Hoist & Der. Co., St. Paul, Minn.
 Clyde Iron Wks. Sales Co., Duluth, Minn.
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Insley Mfg. Co., Indianapolis, Ind.
 Lakeside Bridge & Steel Co., No. Milwaukee
 Street Bros. Mach. Wks., Chattanooga, Tenn.
- Derricks, Steel, Portable**
 *Lidgerwood Mfg. Co., Elizabeth, N. J.
 American Hoist & Der. Co., St. Paul, Minn.
 Clyde Iron Wks. Sales Co., Duluth, Minn.
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Street Bros. Mach. Wks., Chattanooga, Tenn.
 Taylor Port. Steel Derrick Co., Chicago
- Diaphragm Pumps (See Pumps)**
- Diesel Engines (See Engines)**
- Diesel Shovels (See Shovels)**
- Diggers, Post Hole, Power (See Augers)**
- Dipper Dredges (See Dredges)**
- Distributing Plants, Concrete (See Concrete Placing Plants)**
- Distributors, Tar, Asphalt and Oil**
 *Austin-Western Road Machy. Co., Chicago
 *Hynze & Co., Inc., E. D., Oregon, Ill.
 *Hvass & Co., Inc., Chas., New York
 *Kinney Mfg. Co., Boston, Mass.
 Good Roads Machy. Co., Kennett Square, Pa.
 Monhorst Co., Jos., Cincinnati, Ohio
- Macleod Co., Cincinnati, Ohio
 Municipal Supply Co., South Bend, Ind.
 Sacramento Engg. & Mach. Works, Sacramento Calif.
 Spears-Wells Machy. Co., Oakland, Calif.
 Universal Rd. Machy. Co., Kingston, N. Y.
- Ditchers (See Excavators, Trench; or Graders)**
- Drag Scrapers (See Scrapers)**
- Drag Shovels (See Shovels, Convertible)**
- Dragline Cableways (See Cableways)**
- Dragline Scrapers (See Scrapers)**
- Drags, Road**
 *Austin-Western Road Machy. Co., Chicago
 *General Wheelbarrow Co., Cleveland, Ohio
 Acme Road Machy. Co., Frankfort, N. Y.
 Adams Co., J. D., Indianapolis, Ind.
 American Steel Scraper Co., Sidney, Ohio
 Beach Mfg. Co., Charlotte, Mich.
 Deere & Co., Moline, Ill.
 Foote Bros. Gear & Machine Co., Chicago
 Gallion Iron Wks. & Mfg. Co., Gallion, Ohio
 Harris Co., B. W. & Leo, Minneapolis, Minn.
 Miskin Scraper Works, Ucon, Idaho
 Northfield Iron Co., Northfield, Minn.
 Slusser McLean Scraper Co., Sidney, Ohio
 Spears-Wells Machy. Co., Oakland, Calif.
 Toledo Wheelbarrow Co., Toledo, Ohio
 Universal Road Machy. Co., Kingston, N. Y.
 Western Wheeled Scraper Co., Aurora, Ill.
- Drainage Equipment, Special**
 Killefer Mfg. Co., Los Angeles, Calif.
- Drainage Tile (See Tile)**
- Drawing Inks (See Inks)**
- Drawing Instruments and Supplies (See Instruments)**
- Dredges, Dipper**
 *Bay City Shovels, Inc., Bay City, Mich.
 *Osgood Co., Marion, Ohio
 American Steel Dredge Co., Ft. Wayne, Ind.
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Marion Steam Shovel Co., Marion, Ohio
- Dredges, Hydraulic**
 American Steel Dredge Co., Fort Wayne, Ind.
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Ellicott Mach. Corp., Baltimore, Md.
 Morris Machine Works, Baldwinville, N. Y.
- Dredging Buckets (See Buckets)**
- Dredging Machinery (See also Pumps, Dredging)**
 *Lidgerwood Mfg. Co., Elizabeth, N. J.
 *McKiernan-Terry Corp., New York
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Ellicott Mach. Corp., Baltimore, Md.
 Mundy Hoisting Eng. Co., J. S., Newark, N. J.
 Street Bros. Mach. Wks., Chattanooga, Tenn.
 Thomas Elevator Co., Chicago
- Dredging Pumps (See Pumps)**
- Dressing, Belt**
 Dixon Crucible Co., Jos. Jersey City, N. J.
 Hotelling Mfg. Co., Philadelphia
 Stephenson Mfg. Co., Albany, N. Y.
 Tropical Paint & Oil Co., Cleveland, Ohio
 U. S. Rubber Co., New York
- Drill Steel, Hollow (See Steel)**
- Drill Steel Sharpeners (See Sharpeners)**
- Drills, Blast Hole and Well**
 *Keystone Driller Co., Beaver Falls, Pa.
 Armstrong Mfg. Co., Waterloo, Iowa
 Loomis Machine Co., Tiffin, Ohio
 Sanderson Cyclone Drill Co., Orrville, Ohio
 Star Drilling Machine Co., Akron, Ohio
- Drills, Core**
 *McKiernan-Terry Corp., New York
 Ingersoll-Rand Co., New York
 Loomis Machine Co., Tiffin, Ohio
 Mott Core Drilling Co., Huntington, W. Va.
 Sprague & Henwood, Inc., Scranton, Pa.
 Sullivan Machinery Co., Chicago
- Drills, Electric**
 Black & Decker Mfg. Co., Towson, Md.
 Chicago Pneumatic Tool Co., New York
 Cincinnati Electric Tool Co., Cincinnati, Ohio
 Independent Pneu. Tool Co., Chicago
 Portable Power Tool Corp., Warsaw, Ind.
 Ryerson & Son, Jos. T., Chicago
- Speedway Mfg. Co., Cicero, Ill.
 Syntroon Co., Pittsburgh, Pa.
 U. S. Electrical Tool Co., The, Cincinnati
 Van Dorn Elec. Tool Co., Towson, Md.
 Wappat, Inc., Pittsburgh, Pa.
 Wedack Elec. Tool Corp., Chicago
- Drills, Rock, Pneumatic**
 *Hardsoc Wonder Drill Co., Ottumwa, Ia.
 Buhl Co., The, Chicago
 Chicago Pneu. Tool Co., New York
 Cleveland Pneu. Tool Co., Cleveland
 Dallett Co., Philadelphia, Pa.
 Gardner-Denver Co., Quincy, Ill.
 Gilman Mfg. Co., E. Boston, Mass.
 Helwig Mfg. Co., St. Paul, Minn.
 Independent Pneu. Tool Co., Chicago
 Ingersoll-Rand Co., New York
 Keller, Inc., W. H., Grand Haven, Mich.
 Loomis Machine Co., Tiffin, Ohio
 Sullivan Machinery Co., Chicago
 Wood Drill Works, Paterson, N. J.
- Drivers, Pile (See Hammers)**
- Dryers, Sand and Gravel**
 *Chausse Oil Burner Co., Elkhart, Ind.
 Asroll Burner Co., West New York, N. J.
 Bartlett & Snow Co., O. O., Cleveland, Ohio
 Honhorst Co., Jos., Cincinnati, Ohio
 Macleod Co., Cincinnati, Ohio
 Merriman Asphalt Plant, Inc., Lima, Ohio
- Dump Bodies (See Bodies)**
- Dump Wagons (See Wagons)**
- Dynamite**
 *Hercules Powder Co., Wilmington, Del.
 Atlas Powder Co., Wilmington, Del.
 Austin Powder Co., Cleveland, Ohio
 Egyptian Powder Co., East Alton, Ill.
 du Pont de Nemours & Co., E. I., Wilmington, Del.
 Equitable Powder Mfg. Co., East Alton, Ill.
 Giant Powder Co., San Francisco, Calif.
 Illinois Powder Mfg. Co., St. Louis, Mo.
 King Powder Co., Cincinnati, Ohio
- Electric Cable (See Wire and Cable, Electric)**
- Electric Drills (See Drills)**
- Electric Hoists (See Hoists)**
- Electric Lighting Plants**
 *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 *Homelite Corp., Port Chester, N. Y.
 *Hove Engine Co., Lansing, Mich.
 Climax Engg. Co., Clinton, Iowa
 Cook Motor Co., Delaware, Ohio
 Cushman Motor Works, Lincoln, Neb.
 Fairbanks, Morse & Co., Chicago
 Fuller & Johnson Mfg. Co., Madison, Wis.
 General Electric Co., Schenectady, N. Y.
 Kohler Co., Kohler, Wis.
 Onan & Sons, D. W., Minneapolis, Minn.
 Sullivan Machinery Co., Chicago
 Sunbeam Elec. Mfg. Co., Evansville, Ind.
 Syntroon Co., Pittsburgh, Pa.
 United States Motors Corp., Oakbrook, Wis.
 Westinghouse E. & M. Co., E. Pittsburgh
- Electric Planes (See Planes)**
- Electric Shovels (See Shovels)**
- Electric Transformers (See Transformers)**
- Electric Welding Apparatus (See Welding Apparatus)**
- Elevators, Bucket**
 *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 *Austin-Western Rd. Machy. Co., Chicago
 *Diamond Iron Works, Minneapolis, Minn.
 *Pioneer Gravel Equip. Mfg. Co., Minneapolis
 Chain Belt Co., Milwaukee, Wis.
 Chicago Automatic Conv. Co., Cicero, Ill.
 Fairfield Engg. Co., Marion, Ohio
 Good Roads Machy. Co., Kennett Square, Pa.
 Haiss Mfg. Co., Geo., New York
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Jeffrey Mfg. Co., Columbus, Ohio
 Link-Belt Co., Chicago
 Logan Co., Louisville, Ky.
 New England Rd. Machy. Co., South Boston
 New Holland Mach. Co., New Holland, Mich.
 Rogers Iron Works Co., Joplin, Mo.
 Smith Engg. Works, Milwaukee, Wis.
 Stephens-Adamson Mfg. Co., Aurora, Ill.
 Traylor Engg. & Mfg. Co., Allentown, Pa.
 Universal Road Machy. Co., Kingston, N. Y.
 Webster & Weller Mfg. Co., Chicago
 Western Wheeled Scraper Co., Aurora, Ill.

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover *

Once again...

LITTLEFORD

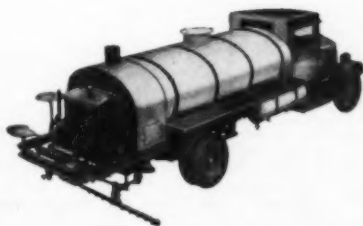
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If you're interested in Asphalt Distributors, don't fail to visit Booth 114 at the A. R. B. A. Road Show. We are taking this occasion to announce the most important addition ever made to the LB line of Road Maintenance Equipment.

Like all other Littleford products, the Littleford Asphalt Distributor represents careful research and engineering combined with the close cooperation of practical road men. It is worthy of your close inspection. Come to Booth 114. Let the men who designed it show you its fine points.



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Elevators, Material

- *Jaeger Machine Co., Columbus, Ohio
- *Lakewood Engg. Co., Columbus, Ohio
- *O. K. Clutch & Machy. Co., Columbia, Pa.
- *Sagen Derrick Co., Chicago
- Chas. Bolt Co., Milwaukee, Wis.
- C. H. & E. Mfg. Co., Milwaukee, Wis.
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Inslay Mfg. Co., Indianapolis, Ind.
- Thomas Elevator Co., Chicago

Embankment Rollers (See Rollers)

Emulsified Asphalt (See Asphalt, Emulsified)

Engineers, Consulting and Inspection (See Directory in this issue)

Engines, Diesel

- *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- *Worthington Pump & Machy. Corp., Harrison, N. J.
- Anderson Eng. & Fdy. Co., Anderson, Ind.
- Atlas Imperial Diesel Eng. Co., Oakland, Calif.
- Bethlehem Steel Co., Bethlehem, Pa.
- Buckeye Machy. Co., Lima, Ohio
- Buda Co., Harvey, Ill.
- Busch-Rulser Bros.-Diesel Eng. Co., St. Louis
- Charter Gas Eng. Co., Sterling, Ill.
- Chicago Pneu. Tool Co., New York
- Cooper-Bessmer Corp., Mt. Vernon, Ohio
- Cummins Engine Co., Columbus, Indiana
- Fairbanks, Morse & Co., Chicago
- Fulton Iron Works Co., St. Louis, Mo.
- Ingersoll-Rand Co., New York
- Johanson Mfg. Co., Seattle, Wash.
- Lombard Governor Co., Ashland, Mass.
- McIntosh & Seymour Corp., Auburn, N. Y.
- Morris & DeLaVerne, Inc., P. P. Philadelphia
- Muncie Oil Engine Co., Muncie, Ind.
- New London Ship & Eng. Co., Groton, Ct.
- Nordberg Mfg. Co., Milwaukee, Wis.
- Power Mfg. Co., Marion, Ohio
- St. Mary's Oil Eng. Co., St. Charles, Mo.
- Stover Mfg. & Eng. Co., Freeport, Ill.
- Waukesha Motor Co., Waukesha, Wis.
- Young Radiator Co., Racine, Wis.

Engines, Gasoline

- *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- *Caterpillar Tractor Co., Peoria, Ill.
- *Continental Motors Corp., Muskegon, Mich.
- *Domestic Eng. & Pump Co., Shippensburg, Pa.
- *Hercules Motors Corp., Canton, Ohio
- *International Harvester Co., Chicago
- *Lansing Corp., New Holstein, Wis.
- *LeRoi Co., Milwaukee, Wis.
- *Novo Engine Co., Lansing, Mich.
- Autocar Co., Ardmore, Pa.
- Beaver Mfg. Co., Milwaukee, Wis.
- Buda Co., Harvey, Ill.
- Charter Gas Eng. Co., Harvey, Ill.
- Climax Eng. Co., Clinton, Iowa
- Cushman Motor Works, Lincoln, Neb.
- Electric Wheel Co., Quincy, Ill.
- Evinrude Div., Outboard Motors Corp., Milwaukee
- Foss Gas Engine Co., Springfield, Ohio
- Fuller & Johnson Mfg. Co., Madison, Wis.
- Hercules Products, Inc., Evansville, Ind.
- Indiana Motorcycle Co., Springfield, Mass.
- Ingersoll-Rand Co., New York
- Starling Engine Co., Buffalo, N. Y.
- Stover Mfg. & Eng. Co., Freeport, Ill.
- Universal Motor Co., Oshkosh, Wis.
- Universal Road Machy. Co., Kingston, N. Y.
- Waukesha Motor Co., Waukesha, Wis.
- Wisconsin Motor Co., Milwaukee, Wis.
- Witte Engine Works, Kansas City, Mo.

Engines, Hoisting (See Hoists)

Engines, Kerosene

- *Hercules Motors Corp., Canton, Ohio
- Climax Eng. Co., Clintonville, Wis.
- Electric Wheel Co., Quincy, Ill.
- Fuller & Johnson Mfg. Co., Madison, Wis.
- Hercules Products, Inc., Evansville, Ind.
- Stover Mfg. & Eng. Co., Freeport, Ill.
- Witte Engine Works, Kansas City, Mo.

Excavators, Bucket-Loading

- Halsey Mfg. Co., Geo., New York
- New England Rd. Machy. Co., S. Boston, Mass.
- Spears-Wells Machy. Co., Oakland, Calif.

Excavators, Dragline

- *Bay City Shovels, Inc., Bay City, Mich.
- *General Excavator Co., Marion, Ohio
- *National Equip. Corp., Milwaukee, Wis.
- *Osgood Co., Marion, Ohio
- American Hoist & Derrick Co., St. Paul
- Buckeye Traction Ditcher Co., Findlay, O.

- Bucyrus-Erie Co., So. Milwaukee, Wis.
- Bucyrus-Monaghan Co., Chicago
- Byers Machine Co., Ravenna, Ohio
- Harnischfeger Corp., Milwaukee, Wis.
- Industrial Brownhoist Corp., Cleveland, O.
- Inslay Mfg. Co., Indianapolis, Ind.
- Manitowoc Eng. Wks., Manitowoc, Wis.
- Marion Steam Shovel Co., Marion, Ohio
- Mead-Morrison Mfg. Co., Boston, Mass.
- Northwest Engg. Co., Chicago
- Ohio Power Shovel Co., Lima, Ohio
- Orton Crane & Shovel Co., Chicago
- Page Engg. Co., Chicago
- Speeder Machy. Corp., Cedar Rapids, Iowa
- Star Drilling Machine Co., Akron, Ohio
- Thew Shovel Co., Lorain, Ohio

Excavators, Trench, Bucket and Wheel-Type

- *National Equip. Corp., Milwaukee, Wis.
- *Shunk Mfg. Co., Bucyrus, Ohio
- Austin Machinery Corp., Muskegon, Mich.
- Barber-Greene Co., Aurora, Ill.
- Buckeye Traction Ditcher Co., Findlay, O.
- C. H. & E. Mfg. Co., Milwaukee, Wis.
- Cleveland Trencher Co., Cleveland, Ohio
- Industrial Brownhoist Corp., Cleveland, O.
- Ruth Dredger Mfg. Corp., Ltd., Los Angeles, Calif.

Expansion Joint Material, Paving

- *Carey Co., Philip, Cincinnati, Ohio
- *Servicised Products Corp., Chicago
- *Standard Oil Co. of Ind., Chicago
- *Truscon Steel Co., Youngstown, Ohio
- Johns-Manville Corp., New York
- Kalman Steel Co., Chicago
- Meadows, Inc., W. R., Elgin, Ill.
- Ohio Fibrated Asph. & Rubber Co., Chicago
- St. Paul Corrugating Co., St. Paul, Minn.
- Western Elastite Roofing Co., Denver, Colo.

Explosives (See Dynamite or Powder, Black)

Explosives Storage (See Magazines)

Fabric Reinforcing for Concrete (See Wire Fabric Reinforcing)

Fence, Snow

- Good Roads Machy. Co., Kennett Square, Pa.
- Illinois Wire & Mfg. Co., Joliet, Ill.
- New Jersey Fence Co., Burlington, N. J.
- Northfield Iron Co., Northfield, Minn.
- Rowe Mfg. Co., Galesburg, Ill.
- Wickwire-Spencer Steel Co., New York

Fence, Wire and Iron

- *American Steel & Wire Co., Chicago
- American Fence Const. So., New York
- American Wire Fence Co., Chicago
- Anchor Post Fence Co., New York
- Bethlehem Steel Co., Bethlehem, Pa.
- Chain Link Fence Co., Chicago
- Continental Steel Corp., Kokomo, Ind.
- Cyclone Fence Co., Waukegan, Ill.
- Edwards Mfg. Co., Cincinnati, Ohio
- Giant Mfg. Co., Council Bluffs, Iowa
- Indiana Steel & Wire Co., Muncie, Ind.
- Interlocking Fence Co., Morton, Ill.
- Keystone Steel & Wire Co., Peoria, Ill.
- Page Fence Assn., Chicago
- Page Steel & Wire Co., Bridgeport, Conn.
- Pittsburgh Steel Co., Pittsburgh, Pa.
- Stewart Iron Works Co., Cincinnati, Ohio
- Van Dorn Iron Works, Cleveland, Ohio
- Wayne Iron Works, Wayne, Pa.
- Wickwire-Spencer Steel Co., New York

Finishers, Asphalt Road

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Lakewood Engg. Co., Cleveland, Ohio

Finishers, Concrete Road

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Heltzel Steel Form & Iron Co., Warren, Ohio
- *Lakewood Engg. Co., Cleveland, Ohio

Finishing Machines, Shoulder

- *Morris-Bennett Corp., Edinburg, Ill.
- Inslay Mfg. Co., Indianapolis, Ind.

Fittings, Derrick

- *Hayward Co., New York
- *Lidgerwood Mfg. Co., Elizabeth, N. J.
- *Sagen Derrick Co., Chicago
- American Hoist & Der. Co., St. Paul, Minn.
- Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
- Flory Mfg. Co., S. Bangor, Pa.
- Mundy Hoisting Eng. Co., J. S., Newark, N. J.
- Street Bros. Mach. Wks., Chattanooga, Tenn.

Fittings, Pipe

- *Littleford Bros., Cincinnati, Ohio
- *U. S. Pipe & Fdy. Co., Burlington, N. J.
- American Cast Iron Pipe Co., Birmingham, Ala.
- Builders Iron Fdy., Providence, R. I.
- Central Foundry Co., New York
- Clow & Sons, J. B., Chicago
- Crane Co., Chicago
- Donaldson Iron Co., Emaus, Pa.
- Kennedy Valve Mfg. Co., Elmira, N. Y.
- Lankenheimer Co., Cincinnati, Ohio
- Natl. C. I. Pipe Co., Birmingham, Ala.
- Reading Steel Cast. Co., Inc., Bridgeport, Ct.
- Walworth Co., Boston, Mass.
- Warren Fdy. & Pipe Co., New York
- Westinghouse E. & M. Co., E. Pittsburgh, Pa.
- Wood & Co., R. D., Philadelphia

Fittings, Wire Rope

- *American Steel & Wire Co., Chicago
- *Williamsport Wire Rope Co., Williamsport, Pa.
- Broderick & Bascom Rope Co., St. Louis
- Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
- Green, L. P., Chicago
- Leschen & Sons Rope Co., A., St. Louis
- Rebbling's Sons Co., John A., Trenton, N. J.
- Upson-Walton Co., Cleveland, Ohio
- Wilcox-Crittenden Co., Inc., Middletown, Ct.

Floodlights, Acetylene, Portable

- *National Carbide Sales Co., New York
- Macleod Co., Cincinnati, Ohio
- Milburn Co., Alexander, Baltimore, Md.
- Oxweld Acetylene Co., New York

Floodlights, Electric, Portable

- *Homelite Corp., Port Chester, N. Y.
- Crouse-Hinds Co., Syracuse, N. Y.
- General Electric Co., Schenectady, N. Y.
- Kohler Co., Kohler, Wis.

Floodlights, Stationary

- B.B.T. Corp., Philadelphia
- Crouse-Hinds Co., Syracuse, N. Y.
- General Electric Co., Schenectady, N. Y.
- Giant Mfg. Co., Council Bluffs, Iowa
- Westinghouse E. & M. Co., E. Pittsburgh, Pa.

Flooring, Bridge, Asphalt

- *Servicised Products Corp., Chicago
- Flintkote Co., The, Boston, Mass.
- Headley Emulsified Prod. Co., Philadelphia
- Johns-Manville Co., New York
- Meadows, Inc., W. R., Elgin, Ill.

Floorings, Asphaltic Cement

- *Union Products Co., The, Cleveland, O.

Forges, Oil

- Hauck Mfg. Co., Brooklyn, N. Y.

Form Clamps and Ties (See Clamps and Ties, Form)

Forms, Concrete Culvert

- *Blaw-Knox Co., Pittsburgh, Pa.
- Concrete Form Co., Inc., Syracuse, N. Y.
- Northfield Iron Co., Northfield, Minn.

Forms, Concrete Manhole

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Heltzel Steel Form & Iron Co., Warren, O.
- Hotchkiss Steel Prod. Co., Binghamton, N. Y.
- Metal Forms Corp., Milwaukee, Wis.

Forms, Concrete Pipe

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Heltzel Steel Form & Iron Co., Warren, O.
- Climax Machy. Co., Indianapolis, Ind.
- Marion Iron Works, Los Angeles, Calif.
- Quinn Wire & Iron Wks., Boone, Iowa
- R. & L. Concrete Machy. Co., Kendallville, Ind.

Forms, Concrete Road

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Heltzel Steel Form & Iron Co., Warren, Ohio
- *Lakewood Engg. Co., Columbus, Ohio
- Truscon Steel Co., Youngstown, Ohio
- Harm Co., George O., Warren, Ohio
- Hotchkiss Steel Prods. Co., Binghamton, N. Y.
- Metal Forms Corp., Milwaukee, Wis.

Forms, Curb and Gutter

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Heltzel Steel Form & Iron Co., Warren, O.
- *Littleford Bros., Cincinnati, Ohio
- Truscon Steel Co., Youngstown, Ohio
- Hotchkiss Steel Prods. Co., Binghamton, N. Y.
- Metal Forms Corp., Milwaukee, Wis.

Forms, for Macadam

- *Heltzel Steel Form & Iron Co., Warren, Ohio

Forms, Sidewalk

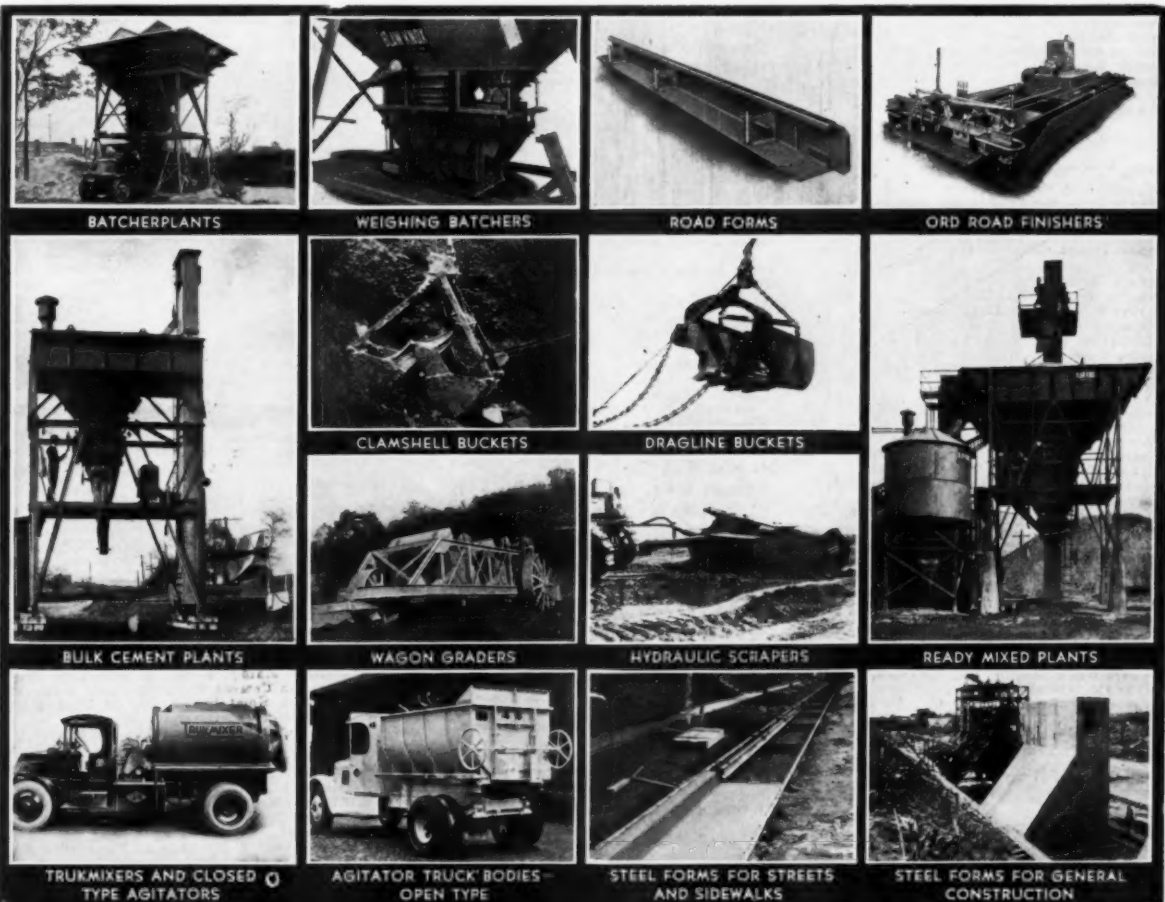
- *Blaw-Knox Co., Pittsburgh, Pa.
- *Heltzel Steel Form & Iron Co., Warren, Ohio
- Hotchkiss Steel Prods. Co., Binghamton, N. Y.
- Metal Forms Corp., Milwaukee, Wis.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY

It pays to deal with Blaw-Knox

For twenty-five years the construction industry has depended upon Blaw-Knox for many items of equipment to make work easier, more precise, and less costly. Blaw-Knox has successively developed new machinery in anticipation of each new trend in construction. It is constantly developing new ideas and improvements.

Blaw-Knox makes equipment to do the work, not to meet a price, although thousands of users know that Blaw-Knox Products are priced reasonably.



BLAW-KNOX

2067 Farmers Bank Bldg., Pittsburgh, Pa.
New York Philadelphia
Chicago Birmingham
Buffalo

Export Division:
Blaw-Knox International Corporation,
Canadian Pacific Bldg., New York

London, England, New Oxford House, Hart St.,
Holborn W.C.1.—Paris, France, 1 Rue de Cligny
—Milan, Italy, 6, via S. Agnese, 6—Düsseldorf,
Germany, 17 Bismarckstrasse

WHERE TO PURCHASE

Fresnos (See Scrapers, Rotary)

Furnaces, Lead Melting

- *Chausse Oil Burner Co., Elkhart, Ind.
- *Littleford Bros., Cincinnati, Ohio
- Aeroli Burner Co., West New York, N. Y.
- Chicago Flexible Shaft Co., Chicago
- Hauck Mfg. Co., Brooklyn, N. Y.
- MacLeod Co., Cincinnati, Ohio
- Smith Mfg. Co., A. P., East Orange, N. J.
- Stuebner Iron Works, Inc., G. L., Long Island City, N. Y.

Gasoline Engines (See Engines)

Gasoline Hoists (See Hoists)

Gasoline Shovels (See Shovels)

Gasoline Storage Tanks (See Tanks)

Gates, Bin

- *Austin-Western Rd. Machinery Co., Chicago
- *Butler Bin Co., Waukegan, Wis.
- *Heltzel Steel Form & Iron Co., Warren, Ohio
- *Inley Mfg. Co., Indianapolis, Ind.
- *Lakewood Engg. Co., Columbus, Ohio
- *Ransome Conc. Machy. Co., Dunellen, N. J.
- Beaumont Co., R. H., Philadelphia
- Chain Belt Co., Milwaukee, Wis.
- Good Roads Machy. Co., Kennett Square, Pa.
- Hais Mfg. Co., Geo., New York
- Neff & Fry Co., Camden, Ohio
- New Holland Machine Co., New Holland, Pa.
- Robins Conv. Belt Co., New York
- Smith Engg. Works, Milwaukee, Wis.
- Traylor Engg. & Mfg. Co., Allentown, Pa.
- Universal Road Machy. Co., Kingston, N. Y.
- Webster & Weller Mfg. Co's, Chicago

Generators (See Motors and Generators)

Giants, Hydraulic

- Abendroth & Root Mfg. Co., New York
- Hendy Iron Works, Joshua, San Francisco
- Johnson Mfg. Co., Seattle, Wash.

Grader Blades (See Blades)

Graders, Road

- *Austin-Western Rd. Machy. Co., Chicago
- *Baker Mfg. Co., Springfield, Ill.
- *Blaw-Knox Co., Pittsburgh, Pa.
- *Caterpillar Tractor Co., Peoria, Ill.
- Acme Road Machy. Co., Frankfort, N. Y.
- Adams Co., J. D., Indianapolis, Ind.
- Beach Mfg. Co., Charlotte, Mich.
- Foot Bros. Gear & Machine Co., Chicago
- Gallen Iron Wks. & Mfg. Co., Gallen, O.
- Gilbert Mfg. Co., Stillwater, Minn.
- Monroe & Sons, N. S., Arthur, Ill.
- Northfield Iron Co., Northfield, Minn.
- Ryan Mfg. Co., Chicago
- Spears-Weiss Machy. Co., Oakland, Calif.
- Stroud Rd. Machy. Co., Omaha, Neb.
- Western Wheel Scraper Co., Aurora, Ill.
- Wood & Co., L. C., Alden, Iowa

Graders, Road, Power

- *Caterpillar Tractor Co., Peoria, Ill.
- *Hiddell Co., W. A., Bucyrus, Ohio
- Adams Co., J. D., Indianapolis, Ind.
- Beach Mfg. Co., Charlotte, Mich.
- Gallen Iron Wks. & Mfg. Co., Gallen, Ohio
- Good Roads Machy. Co., Kennett Square, Pa.
- Rome Mfg. Co., Rome, N. Y.
- Spears-Weiss Machy. Co., Oakland, Calif.
- Wehr Co., Gudahy, Wis.
- Western Wheel Scraper Co., Aurora, Ill.

Graders, Road, Trench, Form

- Carr & Co., Ted, Chicago

Granite Block Paving (See Block Paving)

Grating, Steel

- *Blaw-Knox Co., Pittsburgh, Pa.
- Hendrick Mfg. Co., Carbondale, Pa.

Gravel Dryers (See Dryers)

Gravel Washers (See Washers)

Gravity Conveyors (See Conveyors)

Grease (See Lubricants)

Grizzlies (See also Crushers, Rock)

- *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- Bartlett & Snow Co., O. O., Cleveland, O.
- Link-Belt Co., Chicago
- Robins Conv. Belt Co., New York
- Rogers Iron Wks. Co., Joplin, Mo.
- Smith Engg. Works, Milwaukee, Wis.
- Stephens-Adamson Mfg. Co., Aurora, Ill.
- Traylor Engg. & Mfg. Co., Allentown, Pa.
- Webster & Weller Mfg. Co's, Chicago

Grouting Machines

- *Ransome Conc. Machy. Co., Dunellen, N. J.

Guard Rail, Highway

- *American Steel & Wire Co., Chicago
- *Truscon Steel Co., Youngstown, Ohio
- American Wire Fence Co., Chicago
- Anchor Post Fence Co., New York
- Chain Belt Co., Milwaukee, Wis.
- Chain Link Fence Co., Chicago
- Cyclone Fence Co., Waukegan, Ill.
- Hazard Wire Rope Co., Wilkes-Barre, Pa.
- Page Steel & Wire Co., Bridgeport, Conn.
- Stewart Iron Works Co., Cincinnati, Ohio
- Upson-Walton Co., Cleveland, Ohio
- Wickwire-Spencer Steel Co., New York

Guards, Paving, Steel

- Godwin Co., W. S., Baltimore, Md.

Guards, Steel, for Curbs

- *Truscon Steel Co., Youngstown, Ohio
- Concrete Steel Co., New York
- Godwin Co., W. S., Baltimore, Md.

Guy Derricks (See Derricks)

Hammers, Pile, Drop

- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
- Vulcan Iron Works, Chicago

Hammers, Sheetting, Hand, Power

- *McKiernan-Terry Corp., New York
- Chicago Pneumatic Tool Co., New York
- Rodax Corp., Chicago
- Union Iron Works, Hoboken, N. J.
- Ingersoll-Rand Co., New York

Hammers, Sheetting and Pile, Power

- *McKiernan-Terry Corp., New York
- Union Iron Works, Hoboken, N. J.
- Vulcan Iron Works, Chicago

Hand Brooms (See Brooms)

Hand Hoists (See Hoists)

Heaters, Surface, Asphalt

- *Chausse Oil Burner Co., Elkhart, Ind.
- *Littleford Bros., Cincinnati, Ohio
- Aeroli Burner Co., West New York, N. Y.
- Barber Asphalt Co., Philadelphia
- Equitable Asph. Maint. Co., Kansas City, Mo.
- Hauck Mfg. Co., Brooklyn, N. Y.
- MacLeod Co., Cincinnati, Ohio
- Mohawk Asphalt Heater Co., Schenectady, N. Y.
- Western Wheel Scraper Co., Aurora, Ill.

Heaters, Tank Car

- *Etnyre & Co., Inc., E. D., Oregon, Ill.
- Cleaver & Co., Inc., J. C., Oregon, Ill.

Heating Kettles (See Kettles)

Heating Torches (See Torches)

Highway Guard Rail (See Guard-Rail)

Hitches, Tractor

- *International Harvester Co., Chicago
- *Schaefer Co., Gustav, Cleveland, Ohio
- *Trackson Co., Milwaukee, Wis.
- Davenport Mfg. Co., Los Angeles, Calif.
- Deere & Co., Moline, Ill.
- Eberhard Mfg. Co., Cleveland, Ohio
- Trail-IT Co., St. Paul, Minn.
- Troy Trailer & Wagon Co., Troy, Ohio
- Western Wheel Scraper Co., Aurora, Ill.
- Whitehead & Kales Co., Detroit, Mich.

Hoist Buckets (See Buckets)

Hoists, Belt-Driven

- *Davis, Inc., Norris K., San Francisco, Calif.
- *Domestic Eng. & Pump Co., Shippensburg, Pa.
- *Lidgerwood Mfg. Co., Elizabeth, N. J.
- *Sterling Machy. Corp., Kansas City, Mo.
- Acme Road Machy. Co., Frankfort, N. Y.
- American Hoist & Derrick Co., St. Paul
- Brown Clutch Co., Sandusky, Ohio
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
- Fridy Hoist & Machy. Co., Mountville, Pa.
- Lansing Co., Lansing, Mich.
- Link-Belt Co., Chicago
- Mead-Morrison Mfg. Co., Boston, Mass.
- Mundy Hoisting Eng. Co., J. S., Newark, N. J.
- Rogers Iron Wks. Co., Joplin, Mo.
- Street Bros. Mach. Works, Chattanooga, Tenn.
- Universal Hoist & Mfg. Co., Cedar Falls, Ia.
- Williams Hoist Co., Los Angeles, Calif.

Hoists, Concrete Tower and Material

- *Davis, Inc., Norris K., San Francisco, Calif.
- *Domestic Eng. & Pump Co., Shippensburg, Pa.
- *Jaeger Machine Co., Columbus, Ohio
- *Lidgerwood Mfg. Co., Elizabeth, N. J.
- *McKiernan-Terry Co., New York
- *Novo Engine Co., Lansing, Mich.
- *Sterling Machy. Corp., Kansas City, Mo.
- Brown Clutch Co., Sandusky, Ohio
- C. H. & E. Mfg. Co., Milwaukee, Wis.
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Fridy Hoist & Machy. Co., Mountville, Pa.
- Lansing Co., Lansing, Mich.
- Mead-Morrison Mfg. Co., Boston, Mass.
- Mundy Hoisting Eng. Co., J. S., Newark, N. J.
- Rogers Iron Wks. Co., Joplin, Mo.
- Street Bros. Mach. Works, Chattanooga, Tenn.
- Thomas Elevator Co., Chicago, Ill.
- Universal Hoist & Mfg. Co., Cedar Falls, Ia.

Hoists, Electric

- *Davis, Inc., Norris K., San Francisco, Calif.
- *Domestic Eng. & Pump Co., Shippensburg, Pa.
- *Euclid-Armington Corp., Cleveland, Ohio
- *Jaeger Machine Co., Columbus, Ohio
- *Lidgerwood Mfg. Co., Elizabeth, N. J.
- *McKiernan-Terry Corp., New York
- *Novo Engine Co., Lansing, Mich.
- *Sagen Derrick Co., Kansas City, Mo.
- *Sterling Machy. Corp., Kansas City, Mo.
- American Hoist & Derrick Co., St. Paul
- Beaumont Co., R. H., Philadelphia
- Brown Clutch Co., Sandusky, Ohio
- C. H. & E. Mfg. Co., Milwaukee, Wis.
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Dake Engine Co., Grand Haven, Mich.
- Detroit Hoist & Mach. Co., Detroit, Mich.
- Diamond Iron Works, Minneapolis, Minn.
- Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
- Ellicott Mach. Corp., Baltimore, Md.
- English Bros. Machy. Co., Kansas City, Mo.
- Fridy Hoist & Machy. Co., Mountville, Pa.
- Gardner-Denver Co., Quincy, Ill.
- Godfrey Conveyor Co., Elkhart, Ind.
- Hais Mfg. Co., Geo., New York
- Harnischfeger Corp., Milwaukee, Wis.
- Industrial-Brownhoist Corp., Cleveland
- Iowa Mfg. Co., Cedar Rapids, Iowa
- Mead-Morrison Mfg. Co., Boston, Mass.
- Mundy Hoisting Eng. Co., J. S., Newark, N. J.
- Northern Engg. Works, Detroit, Mich.
- Orr & Sembower, Reading, Pa.
- Robbins & Myers Co., Springfield, O.
- Rogers Iron Wks. Co., Joplin, Mo.
- Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
- Street Bros. Mach. Works, Chattanooga, Tenn.
- Sullivan Machinery Co., Chicago, Ill.
- Thomas Elevator Co., Chicago
- Treadwell Engg. Co., Easton, Pa.
- Vulcan Iron Works, Wilkes-Barre, Pa.
- Williams Hoist Co., Los Angeles, Calif.

Hoists, Gasoline

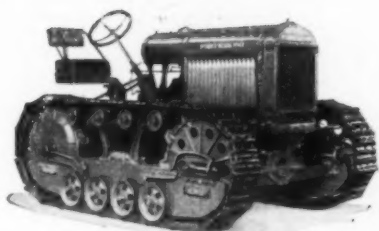
- *Construction Machy. Co., Waterloo, Ia.
- *Davis, Inc., Norris K., San Francisco, Calif.
- *Domestic Eng. & Pump Co., Shippensburg, Pa.
- *Jaeger Machine Co., Columbus, Ohio
- *Lidgerwood Mfg. Co., Elizabeth, N. J.
- *McKiernan-Terry Corp., New York
- *Novo Engine Co., Lansing, Mich.
- *O. K. Clutch & Machy. Co., Columbia, Pa.
- *Sagen Derrick Co., Chicago
- *Sterling Machy. Corp., Kansas City, Mo.
- American Cement Mach. Co., Inc., Keokuk, Ia.
- American Hoist & Der. Co., St. Paul, Minn.
- Beach Mfg. Co., Charlotte, Mich.
- Brown Clutch Co., Sandusky, Ohio
- C. H. & E. Mfg. Co., Milwaukee, Wis.
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Dake Engine Co., Grand Haven, Mich.
- Diamond Iron Works, Minneapolis, Minn.
- Ellicott Machine Corp., Baltimore, Md.
- English Bros. Machy. Co., Kansas City, Mo.
- Fridy Hoist & Machy. Co., Mountville, Pa.
- Iowa Mfg. Co., Cedar Rapids, Ia.
- Joliet Mfg. Co., Joliet, Ill.
- Lansing Co., Lansing, Mich.
- Mead-Morrison Mfg. Co., Boston, Mass.
- Mundy Hoisting Eng. Co., J. S., Newark, N. J.
- Orr & Sembower, Reading, Pa.
- Street Bros. Mach. Works, Chattanooga, Tenn.
- Thomas Elevator Co., Chicago
- Universal Hoist & Mfg. Co., Cedar Falls, Ia.
- Willamette-Ersted Co., Portland, Ore.
- Williams Hoist Co., Los Angeles, Calif.
- Wyman, Robert, Billerica, Mass.

Hoists, Hand

- *Beebe Bros., Inc., Seattle, Wash.
- *Sagen Derrick Co., Chicago
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
- Stephens-Adamson Mfg. Co., Aurora, Ill.

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover *

INSURE PROFITS IN 1932



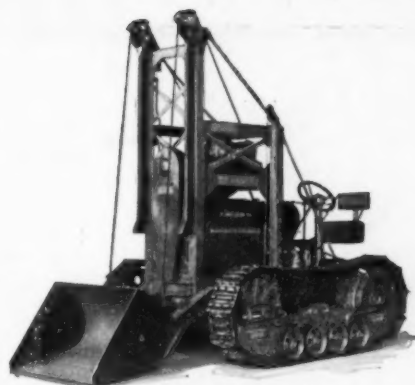
MODEL GH CRAWLER TRACTOR



MODEL LH CRAWLER TRACTOR



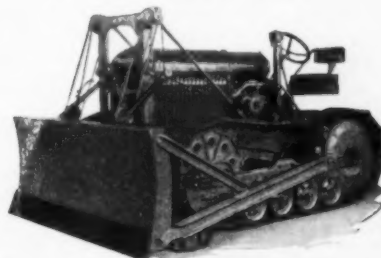
TRACKSON HOIST

MODEL GH
with Pipe Boom

TRACKSON HIGH SHOVEL



TRACKSON LOW SHOVEL



TRACKSON BULLDOZER



7-8-YARD CRAWLER WAGON

PROFITS in 1932 will depend more than ever upon well-chosen equipment. There will be less emotional buying. Equipment of great size and horsepower will be eyed critically in the light of what is actually needed. Trackson Equipment will be much in evidence because of its economy and wide adaptability. It will pay you to check the above machines carefully against your next requirements. TRACKSON COMPANY, 1323 S. First St., Milwaukee, Wisconsin.

BOOTH 237 AT THE ROAD SHOW

TRACKSON

TRACTOR EQUIPMENT

When writing to advertisers please mention CONTRACTORS AND ENGINEERS MONTHLY—Thank you.

WHERE TO PURCHASE

Hoists, Motor Truck Body

- *St. Paul Hyd. Hoist Co., St. Paul, Minn.
- *Trackson Co., Milwaukee, Wis.
- *Wood Hyd. Hst. & Body Co., Detroit, Mich.
- Commercial Shearing & Stamping Co., Youngstown, O.
- Hall Co., Milwaukee, Wis.
- Hughes-Keanan Co., Mansfield, Ohio
- Perfection Steel Body Co., Gallon, Ohio
- Superior Body Corp., Marion, Ind.
- Van Dorn Iron Works Co., Cleveland, Ohio

Hoists, Pneumatic

- Chicago Pneu. Tool Co., New York
- Curtis Pneu. Machy. Co., St. Louis, Mo.
- Dake Engine Co., Grand Haven, Mich.
- Detroit Hoist & Mach. Co., Detroit, Mich.
- Gardner-Denver Co., Quincy, Ill.
- Hanna Engg. Works, Chicago
- Independent Pneu. Tool Co., Chicago
- Ingersoll-Rand Co., New York
- Northern Engg. Works, Detroit, Mich.
- Sullivan Machinery Co., Chicago

Hoists, Portable

- *Beebe Bros., Inc., Seattle, Wash.
- *Nove Engine Co., Lansing, Mich.
- *Saegen Derrick Co., Chicago
- *Sterling Machy. Corp., Kansas City, Mo.
- *Trackson Co., Milwaukee, Wis.
- American Hst. & Der. Co., St. Paul, Minn.
- Beckwith Machine Co., Ravenna, Ohio
- C. H. & E. Mfg. Co., Milwaukee, Wis.
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Fridy Hoist & Machy. Co., Mountville, Pa.
- Heady Iron Works, Joshua, San Francisco
- Ingersoll-Rand Co., New York
- Joliet Mfg. Co., Joliet, Ill.
- Skagit Steel & Iron Works, Sedro Woolley, Wash.
- Street Bros. Mach. Works, Chattanooga, Tenn.
- Sullivan Machinery Co., Chicago
- Thomas Elevator Co., Chicago
- W-K-M Co., Inc., Houston, Texas
- Wyman, Robert, Billerica, Mass.

Hoists, Steam

- *Lidgerwood Mfg. Co., Elizabeth, N. J.
- *McKiernan-Terry Corp., New York
- American Hoist & Der. Co., St. Paul, Minn.
- Clyde Iron Wks. Sales Co., Duluth, Minn.
- Dake Engine Co., Grand Haven, Mich.
- Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
- Elliot Mach. Corp., Baltimore, Md.
- Flory Mfg. Co., S. Bangor, Pa.
- Gardner-Denver Co., Quincy, Ill.
- Halse Mfg. Co., Geo., New York
- Hartley-Tynes Mfg. Co., Birmingham, Ala.
- Mead-Morrison Mfg. Co., Boston, Mass.
- Mundy Hoisting Eng. Co., J. S., Newark, N. J.
- Orr & Sombower, Reading, Pa.
- Rogers Iron Wks. Co., Joplin, Mo.
- Street Bros. Mach. Works, Chattanooga, Tenn.
- Thomas Elevator Co., Chicago
- Treadwell Engg. Co., Easton, Pa.

Hoists, Tractor-Mounted

- *Trackson Co., Milwaukee, Wis.
- Reistator Engg. Corp., Muskogee, Okla.
- Shaffer Specialty Co., Tulsa, Okla.
- Willamette-Ersted Co., Portland, Ore.

Horses, Folding, Steel

- *Toledo Pressed Steel Co., Toledo, Ohio
- Beasley, J. P., Greenville, Texas

Hose, Air

- *Continental Rubber Works, Erie, Pa.
- *Schramm, Inc., West Chester, Pa.
- South Woven Hose & Rub. Co., Cambridge, Mass.
- Buhl Co., The, Chicago, Ill.
- Chicago Pneu. Tool Co., New York
- Cincinnati Rubber Mfg. Co., Cincinnati, O.
- Cleveland Rock Drill Co., Cleveland, Ohio
- Dalliet Co., The, Philadelphia
- Gilman Mfg. Co., East Boston, Mass.
- Goodrich Rubber Co., B. F., Akron, O.
- Goodyear Tire & Rubber Co., Akron, Ohio
- Independent Pneu. Tool Co., Chicago
- Ingersoll-Rand Co., New York
- Mulconroy Co., Inc., Philadelphia
- Pennsylvania Flex. Met. Tubing Co., Phila.
- Republic Rubber Co., Youngstown, Ohio
- United States Rubber Co., New York

Hose, Water

- *Continental Rubber Works, Erie, Pa.
- Cincinnati Rubber Mfg. Co., Cincinnati, O.
- Diamond Rubber Co., Inc., Akron, Ohio
- Fabric Fire Hose Co., New York
- Gardner-Denver Co., Quincy, Ill.
- Goodall Rubber Co., Philadelphia
- Goodrich Rubber Co., B. F., Akron, Ohio
- Goodyear Tire & Rubber Co., Akron, Ohio
- Hewitt-Gutta Percha Rubber Corp., Buffalo, N. Y.
- Mulconroy Co., Philadelphia
- New York Belting & Packing Co., New York
- U. S. Rubber Co., New York

Hose Couplings (See Couplings)

Houses, Tool, Steel (See Buildings, Steel, Portable)

Hydraulic Dredges (See Dredges)

Hydraulic Giants (See Giants)

Hydraulic Rams (See Rams)

Ignition and Starting Systems

- *Electric Auto-Lite Co., Toledo, Ohio

Industrial Railway Cars (See Cars)

Inks, Drawing

- Carter's Ink Co., Boston, Mass.
- Dietsgen Co., Eugene, Chicago
- Higgins & Co., Chas. M., Brooklyn, N. Y.
- Keuffel & Esser Co., Hoboken, N. J.
- Pense Co., O. F., Chicago
- Pelican Works, Gunther Wagner, New York
- Weber Co., F., Philadelphia

Inspection Laboratories (See Directory in this issue)

Instruments and Supplies, Surveyors and Engineers

- Alinworth & Sons, Wm., Denver, Colo.
- Beckman Co., L., Toledo, Ohio
- Berger & Sons, O. L., Boston, Mass.
- Brandis & Sons, Inc., Brooklyn, N. Y.
- Buff & Buff Mfg. Co., Boston, Mass.
- Dietsgen Co., Eugene, Chicago
- Gurley, W. & L. E., Troy, N. Y.
- Keuffel & Esser Co., Hoboken, N. J.
- Kolesch & Co., New York
- Leopold-Volpel & Co., Portland, Ore.
- Lufkin Rule Co., Saginaw, Mich.
- Starrett Co., L. S., Athol, Mass.
- Warren-Knight Co., Philadelphia
- Weber & Co., F., Philadelphia
- White Co., David, Milwaukee, Wis.
- Wood-Regan Inst. Co., South Orange, N. J.

Insulation, Pipe (See Covering)

Iron Fence (See Fence)

Iron Pipe (See Pipe)

Jacks, Lifting

- Blackhawk Mfg. Co., Milwaukee, Wis.
- Buda Co., Harvey, Ill.
- Duff-Norton Mfg. Co., Pittsburgh, Pa.
- Joyce-Cridland Co., Dayton, Ohio
- Lovejoy Tool Works, Chicago
- Oil Jack Co., Ampere, N. J.
- Rees Mfg. Corp., Pittsburgh, Pa.
- Templeton, Kenly & Co., Chicago
- Verona Tool Works, Verona, Pa.
- Watson-Stillman Co., New York

Jacks, Pipe-Forcing

- Blackhawk Mfg. Co., Milwaukee, Wis.
- Clark Co., H. W., Mattson, Ill.
- Duff-Norton Mfg. Co., Pittsburgh, Pa.
- Easy Mfg. Co., Lincoln, Nebr.
- Giant Mfg. Co., Council Bluffs, Ia.
- Joyce-Cridland Co., Dayton, Ohio
- Roper Corp., Geo. D., Rockford, Ill.
- Templeton, Kenly & Co., Chicago

Jacks, Puller

- *Morris-Bennett Corp., Effingham, Ill.
- Duff-Norton Mfg. Co., Pittsburgh, Pa.
- Edelblute Co., T. H., Pittsburgh, Pa.
- Joyce-Cridland Co., Dayton, Ohio
- Puljack Mfg. Co., New York
- Templeton, Kenly & Co., Chicago
- Watson-Stillman Co., New York

Joint Compounds, Sewer (See Compounds)

Joint Materials, Cast Iron Pipe

- Atlas Mineral Products Co., Meristown, Pa.
- Hydraulic Development Co., Boston, Mass.
- Leadite Co., The, Philadelphia
- United Lead Co., New York

Joints, Pipe, Flexible

- *U. S. Pipe & Fdy. Co., Burlington, N. J.
- Coldwell-Wilcox Co., Newburgh, N. Y.
- Dayton Pipe Coupling Co., Dayton, O.
- Dresser Mfg. Co., S. R., Bradford, Pa.
- National Lead Co., New York
- Virtualite Co. of Amer., New York

Joints, Rail (See Rail and Rail Joints)

Kerosene Engines (See Engines)

Kettles, Asphalt and Tar Heating

- *Chausse Oil Burner Co., Elkhart, Ind.
- *Connary & Co., Inc., Philadelphia
- *Cummer & Son Co., F. D., Cleveland, O.

*Hvass & Co., Inc., Chas., New York

- *Kinney Mfg. Co., Boston, Mass.
- *Littleford Bros., Cincinnati, Ohio
- Acme Road Machy. Co., Frankfort, N. Y.
- Aeroli Burner Co., West New York, N. J.
- American Steel Works, Kansas City, Mo.
- Barber Asphalt Co., Philadelphia
- Beach Mfg. Co., Charlotte, Mich.
- Charleroi Iron Works, Charleroi, Pa.
- Hauke Mfg. Co., Brooklyn, N. Y.
- Honhorst Co., Jos., Cincinnati, Ohio
- Lancaster Iron Works, Inc., Lancaster, Pa.
- Macleod Co., Cincinnati, Ohio
- Merriman Asphalt Plant, Inc., Lima, Ohio
- Mohawk Asph. Heater Co., Schenectady, N. Y.
- Spears-Wells Machy. Co., Oakland, Calif.
- Stuebner Iron Wks., Inc., G. L., Long Island City, N. Y.
- Tarrant Mfg. Co., Saratoga Springs, N. Y.
- Universal Road Machy. Co., Kingston, N. Y.

Laboratories, Inspection and Testing (See Directory in this issue)

Lanterns, Contractors'

- *Diets Co., E. E., New York
- *National Carbide Sales Corp., New York
- Defiance Lantern & Stamping Co., Rochester, N. Y.
- Economy Electric Lantern Co., Chicago
- Handlan Buck Mfg. Co., St. Louis
- National Carbon Co., Inc., New York
- Star Headlight & Lantern Co., Rochester, N. Y.

Lead Pipe (See Pipe)

Lettering Guides

- Weber Co., F., Philadelphia, Pa.
- Wood-Regan Inst. Co., South Orange, N. J.

Lighting Plants, Electric (See Electric Lighting Plants)

Lights, Acetylene (See Floodlights)

Lights, Warning (See Lanterns, Contractors, or Torches, Warning)

Liquid Chlorine (See Chlorine)

Loaders (See Excavators, or Conveyors)

Loaders, Bucket, Self-Feeding

- Barber-Greene Co., Aurora, Ill.
- Haise Mfg. Co., Geo., New York
- New England Road Machy. Co., S. Boston, Mass.
- Spears-Wells Machy. Co., Oakland, Calif.

Locomotive Cranes (See Cranes)

Locomotives, Contractors'

- Baldwin Loco. Wks., Philadelphia
- Brookville Loco. Co., Brookville, Pa.
- Davenport Loco. & Mfg. Co., Davenport, Ia.
- Fate-Roat-Heath Co., Plymouth, Ohio
- Haister Loco. Wks., Erie, Pa.
- Ingersoll-Rand Co., New York
- Lima Loco. Wks., Lima, Ohio
- Mid-West Loco. Wks., Hamilton, Ohio
- Milwaukee Loco. Mfg. Co., Milwaukee, Wis.
- Porter Co., H. K., Pittsburgh, Pa.
- Vulcan Iron Works, Wilkes-Barre, Pa.
- Westinghouse E. & M. Co., E. Pittsburgh
- Whitecomb Locomotive Co., Rochelle, Ill.

Lubricants

- *D-A Lubricant Co., Indianapolis, Ind.
- Atlantic Refining Co., Inc., Philadelphia
- Chicago Pneu. Tool Co., New York
- Dixon Crucible Co., Jos., Jersey City, N. J.
- Lubriplate Corp., New York
- Texas Co., The, New York

Lubricators

- Bassick Mfg. Co., The, Chicago
- Carr Fastener Co., Cambridge, Mass.
- Chicago Pneu. Tool Co., New York
- Ingersoll-Rand Co., New York
- McCord Radiator Mfg. Co., Detroit, Mich.
- McCullough Mfg. Co., Minneapolis, Minn.

Macadam, Forms for (See Forms)

Machines (See Various Classifications)

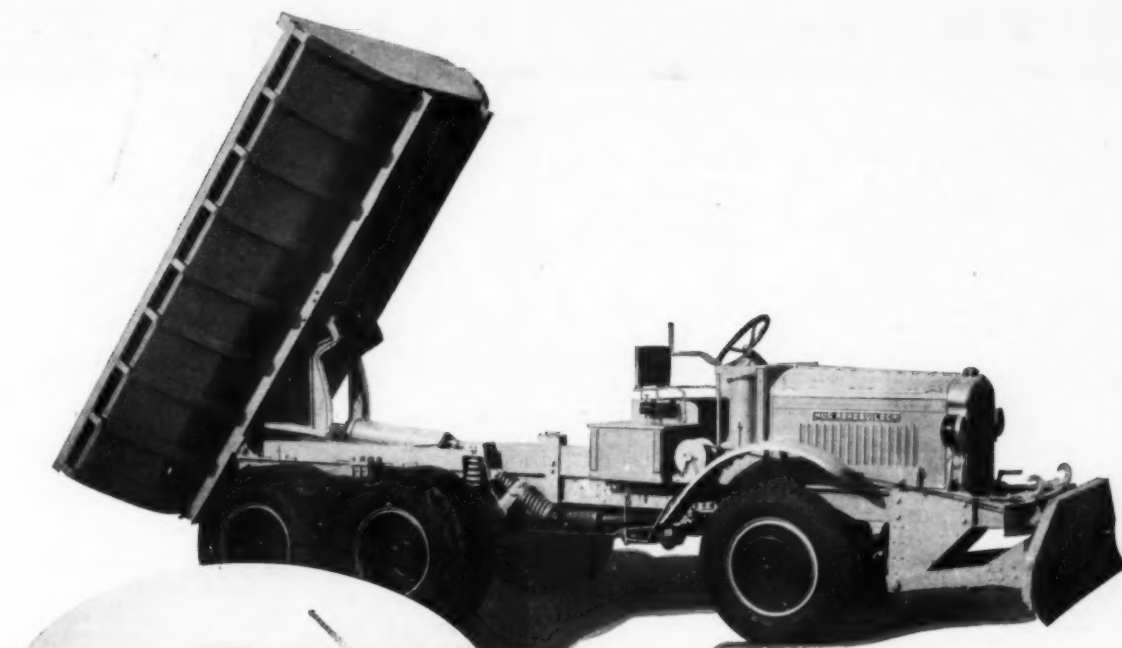
Magazines, Storage, Explosives

- *Hercules Powder Co., Wilmington, Del.
- *Littleford Bros., Cincinnati, Ohio
- Atlas Powder Co., Wilmington, Del.
- du Pont de Nemours & Co., E. I., Wilmington
- New York Blasting Supply Co., New York

Magnetos

- Apollo Magneto Corp., Kingston, N. Y.
- Eisemann Magneto Corp., New York
- Spittorf-Bethlehem Elec. Co., Newark, N. J.
- United American Bosch Corp., Springfield, Mass.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY



View of St. Paul Hoist equipped Hug Truck working on Powell Gaven job at East Prairie, Mo.

Special Model 87 Hug Road Builder Truck with special 7-yd. lever body equipped with Model 7UB St. Paul Underbody Hydraulic Hoist. Has reinforced side extensions and no tail gate. Is also equipped with 6-wheel tractor unit.



On the Button

is prize fight slang for connecting with opponent's chin. Reaching the button requires less power to produce required results. St. Paul Hoists never miss the button in dumping the load, because their powerful lifting arms are connected right to that exact lifting spot just ahead of load center. Less power is required and strain on chassis frame and hinges is avoided. And, unlike the prize ring, St. Paul Hoists, after putting the load away clean, always return the body to normal position without shock, ready for an endless repetition of dumping.

There is a St. Paul Hoist to fit every make and model of truck.

"Ask the Dump Truck Driver on the Job"

— St. Paul —

**VERTICAL AND UNDERBODY
HYDRAULIC HOISTS**

St. Paul Hydraulic Hoist Company

Factories at St. Paul, Minnesota

A St. Paul Hoist Distributor and Service Station is near you. Write for name and address.

When writing to advertisers please mention CONTRACTORS AND ENGINEERS MONTHLY—Thank You.

WHERE TO PURCHASE

Maintainers, Road

*Baker Mfg. Co., Springfield, Ill.
 *Caterpillar Tractor Co., Peoria, Ill.
 *Shunk Mfg. Co., Bucyrus, Ohio
 Adams Co., J. D., Indianapolis, Ind.
 Beach Mfg. Co., Charlotte, Mich.
 Foote Bros. Gear & Machine Co., Chicago
 Gallon Iron Works & Mfg. Co., Gallon, O.
 Gilbert Mfg. Co., Stillwater, Minn.
 Northfield Iron Co., Northfield, Minn.
 Owensboro Ditch & Grad. Co., Owensboro, Ky.
 Root Spring Scraper Co., Kalamazoo, Mich.
 Spears-Wells Machy Co., Oakland, Calif.
 Western Wheeled Scraper Co., Aurora, Ill.
 Willett Mfg. Co., Grand Rapids, Mich.
 Wood & Co., L. O., Alden, Iowa
 York Modern Corp., Unadilla, N. Y.

Manganese Steel Products (See Steel Products)

Manhole Covers (See Castings)

Manila Rope (See Rope)

Material Elevators (See Elevators)

Material Hoists (See Hoists)

Melting Furnaces (See Furnaces)

Mixer Bodies, Concrete (See Bodies)

Mixers, Concrete

*Construction Machy. Co., Waterloo, Ia.
 *Davis, Inc., Norris K., San Francisco, Calif.
 *Jaeger Machine Co., Columbus, Ohio
 *Lakewood Engg. Co., Columbus, Ohio
 *National Equip. Corp., Milwaukee, Wis.
 *Ransome Conc. Machy. Co., Danellen, N. J.
 Acme Road Machy. Co., Frankfort, N. Y.
 American Cement Mach. Co., Inc., Keokuk, Ia.
 Anchor Mfg. Co., Chicago
 Archer Iron Works, Chicago
 Atlas Engg. Co., Clintonville, Wis.
 Beach Mfg. Co., Charlotte, Mich.
 Blystone Mfg. Co., Cambridge Springs, Pa.
 Gibson Bros. Co., Fredonia, Wis.
 Foote Fdy. Co., J. B., Fredericktown, Ohio
 Gilson Bros. Co., Fredonia, Wis.
 Gray Iron Foundry Co., Reading, Pa.
 Knickerbocker Co., Jackson, Mich.
 Lansing Co., Lansing, Mich.
 Leach Co., Oshkosh, Wis.
 Orr & Sembower, Reading, Pa.
 Remmell Mfg. Co., Kewaskum, Wis.

Mixers, Mortar

*Davis, Inc., Norris K., San Francisco, Calif.
 *Jaeger Machine Co., Columbus, O.
 *National Equip. Corp., Milwaukee, Wis.
 Anchor Mfg. Co., Chicago, Ill.
 Blystone Mfg. Co., Cambridge Sprgs., Pa.
 O. H. & E. Mfg. Co., Milwaukee, Wis.
 Chain Belt Co., Milwaukee, Wis.
 Lansing Co., Lansing, Mich.
 Leach Co., Oshkosh, Wis.
 Talbot-Flood Mfg. Co., Kansas City, Mo.

Mortar Boxes (See Boxes)

Mortar Mixers (See Mixers)

Mortar Placing Machines (See Placers)

Motor Trucks (See Trucks)

Motors, Gasoline (See Engines)

Motors and Generators, Electric

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 *Homelite Corp., Port Chester, N. Y.
 American Motors Co., Cedarburg, Wis.
 Century Electric Co., St. Louis, Mo.
 Crocker-Wheeler Co., Ampere, N. J.
 Fairbanks, Morse & Co., Chicago
 General Electric Co., Schenectady, N. Y.
 Graybar Electric Co., New York
 Ideal Electric & Mfg. Co., Mansfield, O.
 Lincoln Electric Co., Cleveland, O.
 Northwestern Mfg. Co., Milwaukee, Wis.
 Robbins & Myers Co., Springfield, O.
 United States Motors Corp., Oshkosh, Wis.
 Wagner Electric Corp., St. Louis, Mo.
 Westinghouse E. & M. Co., E. Pittsburgh, Pa.

Mucking Machines

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 Colodier Co., Inc., The, Columbus, Ohio
 Nordberg Mfg. Co., Milwaukee, Wis.
 St. Louis Power Shovel Co., St. Louis, Mo.

Nozzles, Sluicing (See Giants, Hydraulic)

Oilers, Road (See Distributors)

Oils, Road

*Standard Oil Co. of Ind., Chicago
 *Standard Oil Co. of N. Y., New York
 Atlantic Refining Co., Inc., Philadelphia
 Barber Asphalt Co., Philadelphia
 Headley Emulsified Prod. Co., Philadelphia
 Standard Oil Co. of La., New Orleans, La.
 Standard Oil Co. of N. J., Newark, N. J.
 Texas Co., The, New York

One-Ton Cranes (See Cranes)

Orange Peel Buckets (See Buckets)

Painting Machinery, Spray

*Schramm, Inc., West Chester, Pa.
 Binks Spray Equipment Co., Chicago
 Chicago Pneum. Tool Co., New York
 DeVilbiss Mfg. Co., Toledo, Ohio
 Eclipse Air Brush Co., Newark, N. J.
 Hobart Brothers Co., Troy, Ohio
 Macleod Co., Cincinnati, Ohio
 Matthews Corp., W. N., St. Louis, Mo.
 Milburn Co., Alexander, Baltimore, Mo.
 Paasche Air Brush Co., Chicago, Ill.
 Simons Paint Spray Brush Co., Dayton, O.
 Spraco Painting Equip. Co., Boston, Mass.

Paints, Metal Protection

*Carey Co., Philip, Cincinnati, O.
 *Solway Sales Corp., New York
 Acme White Lead & Color Works, Detroit
 Barber Asphalt Co., Philadelphia
 Barry Co., New York
 Berry Bros., Detroit, Mich.
 Cook Paint & Varnish Co., Kansas City, Mo.
 Detroit Graphite Co., Detroit, Mich.
 Detroit White Lead Works, Detroit, Mich.
 Dixon Crucible Co., Jos., Jersey City, N. J.
 du Pont de Nemours & Co., E. I., Wilmington, Del.
 Headley Emulsified Prod. Co., Philadelphia
 Hoosier Paint Works, Ft. Wayne, Ind.
 McEverlast, Inc., Los Angeles, Calif.
 Minwax Co., New York
 Pittsburgh Plate Glass Co., Milwaukee, Wis.
 Ruberoid Co., New York
 Sherwin-Williams Co., Cleveland, Ohio
 St. Louis Surfact & Paint Co., St. Louis
 Toch Brothers, New York
 Tropical Paint & Oil Co., Cleveland, Ohio
 Truscon Laboratories, Detroit, Mich.
 Walles-Dove-Hermiston Corp., New York

Paper, Waterproof

National Waterproofing Co., Philadelphia
 Sisakraft Co., Chicago
 United Paper Co., E. Braintree, Mass.

Patrol Graders (See Graders)

Pavement Breakers (See Tools, Pneumatic)

Pavers, Concrete

*Jaeger Machine Co., Columbus, Ohio
 *National Equip. Corp., Milwaukee, Wis.
 *Ransome Conc. Machy. Co., Danellen, N. J.
 Chain Belt Co., Milwaukee, Wis.
 Foote Co., Nunda, N. Y.

Paving Brick (See Brick)

Paving Guards (See Guards)

Picks, Hand

Ames-Baldwin-Wyoming Shovel Co., North
 Easton, Pa.
 Hubbard Co., Pittsburgh, Pa.
 Iron City Tool Works, Pittsburgh, Pa.
 Oliver Iron & Steel Corp., Pittsburgh, Pa.
 Verona Tool Works, Pittsburgh, Pa.
 Warren Tool & Forge Co., Warren, Ohio
 Warwood Tool Co., Wheeling, W. Va.

Pile Drivers (See Hammers)

Pile Hammers (See Hammers)

Piles, Concrete

MacArthur Conc. Pile & Foundation Co., New
 York
 Massey Concrete Prods. Corp., Chicago
 Raymond Concrete Pile Co., New York

Piling, Sheet, Interlocking, Steel

Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie Steel Co., Pittsburgh, Pa.
 Lindheimer, S. W., Chicago
 Sheet Piling, Inc., New York
 Weiminger, Inc., New York

Pipe, Cast Iron

*U. S. Pipe & Fdy. Co., Burlington, N. J.
 American Cast Iron Pipe Co., Birmingham,
 Ala.
 Central Foundry Co., New York
 Clow & Sons, James B., Chicago
 Donaldson Iron Co., Emsau, Pa.
 Fox & Co., John, New York
 Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
 McWane Cast Iron Pipe Co., Birmingham, Ala.
 National C. I. Pipe Co., Birmingham, Ala.
 Warren Fdy. & Pipe Co., New York
 Wood & Co., R. D., Philadelphia

Pipe, Concrete

*Newark Concrete Pipe Co., Newark, N. J.
 Gray Concrete Co., Thomsville, N. O.
 Lock Joint Pipe Co., Ampere, N. J.
 Massey Concrete Prods. Corp., Chicago
 Shearman Conc. Pipe Co., Inc., Little Rock,
 Ark.

Pipe, Concrete, Reinforced

*Newark Conc. Pipe Co., Newark, N. J.
 Concrete Products Co., Pittsburgh, Pa.
 Independent Concrete Pipe Co., Indianapolis
 Lock Joint Pipe Co., Ampere, N. J.
 Massey Concrete Prods. Corp., Chicago
 Shearman Conc. Pipe Co., Inc., Little Rock,
 Ark.

Pipe, Culvert (See Culverts; or Pipe, Concrete)

Pipe, Lead

Clow & Sons, James B., Chicago
 Eagle-Picher Lead Co., Chicago
 Gardiner Metal Co., Chicago
 National Lead Co., New York
 United Lead Co., New York
 Windsor Mfg. Co., Milwaukee, Wis.

Pipe, Steel

Balcock & Wilcox Tube Co., New York
 Bethlehem Steel Co., Bethlehem, Pa.
 Biggs Boiler Works Co., Akron, Ohio
 Clow & Sons, James B., Chicago
 Jones & Laughlin Steel Co., Pittsburgh
 Lancaster Iron Works, Lancaster, Pa.
 National Tube Co., Pittsburgh, Pa.
 Petroleum Iron Works, Sharon, Pa.
 Wheeling Steel Corp., Wheeling, W. Va.
 Youngstown Sheet & Tube Co., Youngstown, O.

Pipe, Steel, Spiral

Abendroth & Root Mfg. Co., New York
 American Rolling Mill Co., Middletown, Ohio
 Chicago Metal Mfg. Co., Chicago
 Taylor Forge & Pipe Works, Chicago

Pipe, Steel or Iron, Riveted

*Connelly & Co., Inc., Philadelphia
 *Littleford Bros., Cincinnati, Ohio
 Abendroth & Root Mfg. Co., New York
 Biggs Boiler Works Co., Akron, Ohio
 Birmingham Tank Co., Birmingham, Ala.
 Chattanooga Boiler & Tank Co., Chattanooga
 Chicago Bridge & Iron Works, Chicago
 East Jersey Pipe Co., New York
 Ellicott Mach. Corp., Baltimore, Md.
 Graver Tank & Mfg. Corp., E. Chicago, Ind.
 Hammond Iron Works, Warren, Pa.
 Hardesty Mfg. Co., R., Denver, Colo.
 Honhorst Co., Jos., Cincinnati, Ohio
 Horton Stl. Tank & Mfg. Co., Chicago
 Lancaster Iron Works, Lancaster, Pa.
 Petroleum Iron Works Co., Sharon, Pa.
 Pittsburgh-Des Moines Stl. Co., Pittsburgh
 Stover Steel Tank & Mfg. Co., Freeport, Ill.
 Taylor Forge & Pipe Works, Chicago
 Tippet & Wood, Phillipsburg, N. J.

Pipe, Vitrified Clay

Dee Co., Wm. E., Chicago, Ill.
 Dickey Clay Mfg. Co., W. S., Kansas City
 Evans & Howard Fire Brick Co., St. Louis
 Laclede-Christy Clay Prods. Co., St. Louis
 Pacific Clay Products Co., Los Angeles, Calif.

Pipe, Wood

Buffelen Pipe & Creosoting Co., Tacoma, Wash.
 Federal Tank & Pipe Co., Seattle, Wash.
 Michigan Pipe Co., Bay City, Mich.
 Pacific Tank & Pipe Co., San Francisco, Calif.
 Redwood Mfrs. Co., San Francisco, Calif.
 Standard Wood Pipe Co., Williamsport, Pa.
 Wyckoff & Sons Co., A., Elmira, N. Y.

Pipe, Wrought Iron

Byers Co., A. M., Pittsburgh, Pa.
 Cohoes Rolling Mill Co., Cohoes, N. Y.
 Reading Iron Co., Reading, Pa.
 South Chester Tube Co., Chester, Pa.

Pipe Bending Machines (See Bending Machines)

Pipe Covering (See Covering)

Pipe Cutters (See Cutters)

Pipe Fittings (See Fittings)

Pipe Forcing Jacks (See Jacks)

Pipe Handling Machinery (See Derricks)

Pipe Joint Materials (See Joint Materials)

Pipe Joints, Flexible (See Joints)

Pipe Laying Derricks (See Derricks)

Pipe Pushers (See Jacks)

Pipe Threaders (See Threaders)

Placers, Concrete, Pneumatic

*Ransome Concrete Machy. Co., Danellen, N. J.

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover *

Cletrac invites you to



VISIT CLEVELAND
during ROAD SHOW WEEK

OPEN HOUSE at the CLETRAC PLANT

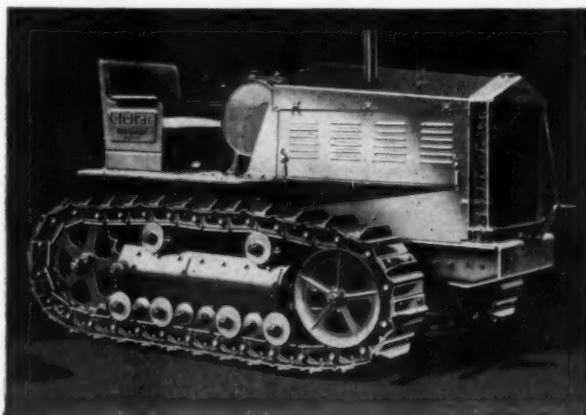
WHEN you go to the road show at Detroit this month, plan a day's stop-over in Cleveland. At the Cletrac plant, OPEN HOUSE has been planned for all of Cletrac's many friends of the A. R. B. A. who can arrange to come — and we promise a day chock full of interest and hospitality. Please consider this your invitation to inspect one of the world's most modern tractor plants and be its guest for a day.

WHEN YOU ARE IN
DETROIT, SEE OR PHONE
CLETRAC'S REPRESENTATIVE
AT THE
BOOK-CADILLAC HOTEL,
FOR ARRANGEMENTS
FOR YOUR TRIP TO
CLEVELAND

It's a short comfortable ride
from the Road Show to Cleve-
land. You can spend the eve-
ning in Detroit and be in
Cleveland next morning at the
great modern Cletrac plant.

A TRIP YOU'LL ENJOY AND REMEMBER

Nothing will be overlooked to make your visit interesting, pleasurable and profitable. We will welcome the opportunity to have you know us better — to have you see the unusual facilities and resources that are back of the service we offer to you and your industry.



Cletrac's 1932 series of power units brings you the outstanding tractor line-up of the year. In it are five tractor sizes (15 h. p. to 80 h. p.) that cover the entire range of industrial power requirements. And all five models have those modern features of continuous oiling, complete dust-proofing and patented "finger-touch" control that have made Cletracs famous.

Make a note in your date-book now, to visit us in Cleveland. We are sure you will find your visit well worth-while.

CLETRAC
CRAWLER TRACTORS

THE CLEVELAND TRACTOR COMPANY

19321 Euclid Avenue

CLEVELAND, OHIO

don't miss it — be sure to **COME!**

WHERE TO PURCHASE

- Placers, Mortar, Pneumatic**
 *Bannome Concrete Machy. Co., Dunellen, N. J.
 Cement Gun Co., Allentown, Pa.
 Conley Plastering Machine Co., Compton, Calif.
 Macleod Co., Cincinnati, Ohio
 Pascrete Corp., Ltd., Long Beach, Calif.
- Planes, Electric**
 Carter Co., Inc., R. L., Phoenix, N. Y.
 Waupat, Inc., Pittsburgh, Pa.
- Planes, Pneumatic**
 *Tousley Tool Co., Cleveland, Ohio
- Planing, Asphalt (See Flooring)**
- Plants, Construction (See Specific Types)**
- Plows, Road and Rooter**
 *Austin-Western Road Machy. Co., Chicago
 *General Wheelbarrow Co., Cleveland, Ohio
 *LaPlant-Cheate Mfg. Co., Inc., Cedar Rapids, Iowa
 *Sme Road Machy. Co., Frankfort, N. Y.
 Adams Co., J. D., Indianapolis, Ind.
 American Steel Scraper Co., Sidney, Ohio
 Beach Mfg. Co., Charlotte, Mich.
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Deere & Co., Moline, Ill.
 Gallion Iron Wks. & Mfg. Co., Gallion, Ohio
 Hackley Equip. Co., P. B., San Francisco
 Harris Co., B. W. & Leo, Minneapolis, Minn.
 Sidney Steel Scraper Co., Sidney, Ohio
 Slusser-McLean Scraper Co., Sidney, Ohio
 Spears-Wells Machy. Co., Oakland, Calif.
 Western Wheeled Scraper Co., Aurora, Ill.
 Wiard Plow Co., Batavia, N. Y.
- Plows, Snow (See Snow Removal Machinery)**
- Pneumatic Tools (See Tools, Pneumatic)**
- Portable Buildings, Steel (See Buildings)**
- Portable Steel Derricks (See Derricks)**
- Portland Cement (See Cement)**
- Post Hole Augers (See Augers)**
- Pots, Pouring, Asphalt and Tar**
 *Littleford Bros., Cincinnati, Ohio
 *Acme Road Machy. Co., Frankfort, N. Y.
 Barber Asphalt Co., Philadelphia
 Beach Mfg. Co., Charlotte, Mich.
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Durlach Can. & Iron Wks., Brooklyn, N. Y.
 Mohawk Asph. Heater Co., Schenectady, N. Y.
 Tarrant Mfg. Co., Saratoga Springs, N. Y.
- Powder, Black**
 *Hercules Powder Co., Wilmington, Del.
 Atlas Powder Co., Wilmington, Del.
 du Pont de Nemours & Co., E. I., Wilmington, Del.
 Egyptian Powder Co., East Alton, Ill.
 Giant Powder Co., San Francisco, Calif.
 Trojan Powder Co., Allentown, Pa.
 United States Powder Co., Terre Haute, Ind.
- Power Pumps (See Pumps)**
- Power Transmission (See Chains or Belts)**
- Presses, Baling**
 Davenport Mfg. Co., Davenport, Ia.
 Economy Baler Co., Ann Arbor, Mich.
 Famous Mfg. Co., E. Chicago, Ind.
 Galland-Henning Mfg. Co., Milwaukee, Wis.
- Puller Jacks (See Jacks)**
- Pullers, Stump**
 *Beebe Bros., Inc., Seattle, Wash.
 Bennett & Co., H. L., Westerville, Ohio
 Clyde Iron Wks. Sales Co., Duluth, Minn.
 Dorsey Bros., Elba, Ala.
 Waldron Corp., John, New Brunswick, N. J.
- Pumping Outfits, Diaphragm**
 *Jaeger Machine Co., Columbus, Ohio
 *Novo Engine Co., Lansing, Mich.
 *Sterling Machy. Corp., Kansas City, Mo.
 Barnes Mfg. Co., Mansfield, Ohio
 Chain Belt Co., Milwaukee, Wis.
 C. H. & E. Mfg. Co., Milwaukee, Wis.
 Humphryes Mfg. Co., Mansfield, Ohio
 Marlow, A. S., Ridgewood, N. J.
 Nelson Bros. Co., Saginaw, Mich.
 Tool & Device Corp., Watford, N. Y.
 Trench & Marine Pump Co., New York
- Pumps, Air-Lift**
 *Worthington Pump & Machy. Corp., Harrison, N. J.
 American Steam Pump Co., Battle Creek, Mich.
 Chicago Pneumatic Tool Co., New York
 Gardner-Denver Co., Quincy, Ill.
 Indiana Pump & Compressor Co., Indianapolis
 Ingersoll-Rand Co., New York
 Sullivan Machinery Co., Chicago
- Pumps, Centrifugal**
 *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 *Brown Clutch Co., Sandusky, Ohio
 *Domestic Eng. & Pump Co., Shippensburg, Pa.
 *Homelite Corp., Fort Chester, N. Y.
 *Jaeger Machine Co., Columbus, Ohio
 *Keystone Driller Co., Beaver Falls, Pa.
 *Novo Engine Co., Lansing, Mich.
 *Worthington Pump & Machy. Corp., Harrison, N. J.
 Aldrich Pump Co., Allentown, Pa.
 American Steam Pump Co., Battle Creek, Mich.
- American Well Works, Aurora, Ill.**
 Aurora Pump & Mfg. Co., Aurora, Ill.
 Barnes Mfg. Co., Mansfield, Ohio
 Buffalo Steam Pump Co., Buffalo, N. Y.
 Chain Belt Co., Milwaukee, Wis.
 C. H. & E. Mfg. Co., Milwaukee, Wis.
 Chicago Pump Co., Chicago
 Dayton-Dowd Co., Quincy, Ill.
 Dean Hill Pump Co., Anderson, Ind.
 De Laval Steam Turbine Co., Trenton, N. J.
 Deming Co., Salem, Ohio
 Ebel Holst & Pump Co., Lansing, Mich.
 Economy Pumping Machy. Co., Chicago
 Ellicott Mach. Corp., Baltimore, Md.
 Evinrude Div., Outboard Motors Corp., Milwaukee
 Fairbanks, Morse & Co., Chicago
 Goulds Pumps, Inc., Seneca Falls, N. Y.
 Humphryes Mfg. Co., Mansfield, Ohio
 Ingersoll-Rand Co., New York
 Indiana Pump & Comp. Co., Indianapolis, Ind.
 Ingersoll-Rand Co., New York
 LaBour Co., Inc., Elkhart, Ind.
 Lawrence Pump & Engine Co., Lawrence, Mass.
 Lecourtney Co., Newark, N. J.
 Manistee Iron Works, Manistee, Mich.
 Marlow, A. S., Ridgewood, N. J.
 Morris Machine Works, Baldwinville, N. Y.
 Pelton Water Wheel Co., San Francisco, Calif.
 Pennsylvania Pump & Comp. Co., Easton, Pa.
 Rumsey Pump Co., Seneca Falls, N. Y.
 United Iron Works, Inc., Kansas City, Mo.
 Universal Motor Co., Oshkosh, Wis.
 Warren Steam Pump Co., Warren, Mass.
 Weinman Pump Mfg. Co., Columbus, Ohio
- Pumps, Centrifugal, Portable**
 *Domestic Eng. & Pump Co., Shippensburg, Pa.
 *Homelite Corp., Fort Chester, N. Y.
 *Jaeger Machine Co., Columbus, Ohio
 *Novo Engine Co., Lansing, Mich.
 *Sterling Machy. Corp., Kansas City, Mo.
 American Stm. Pump Co., Battle Creek, Mich.
 Barnes Mfg. Co., Mansfield, Ohio
 Carter Co., Ralph B., Hackensack, N. J.
 Chain Belt Co., Milwaukee, Wis.
 Deming Co., Salem, Ohio
 Humphryes Mfg. Co., Mansfield, Ohio
 LaBour Co., Inc., Elkhart, Ind.
 Lawrence Pump & Engine Co., Lawrence, Mass.
 Marlow, A. S., Ridgewood, N. J.
 Portable Power Co., New York
 Trench & Marine Pump Co., New York
 Union Iron Works, Inc., Hoboken, N. J.
- Pumps, Deep Well**
 *Domestic Eng. & Pump Co., Shippensburg, Pa.
 *Keystone Driller Co., Beaver Falls, Pa.
 *Novo Engine Co., Lansing, Mich.
 *Worthington Pump & Machy. Corp., Harrison, N. J.
 Alamo Engine Co., Hillsdale, Mich.
 Aldrich Pump Co., Allentown, Pa.
 American Stm. Pump Co., Battle Creek, Mich.
 American Well Works, Aurora, Ill.
 Barnes Mfg. Co., Mansfield, Ohio
 Byron Jackson Co., Berkeley, Calif.
 Cook, Inc., A. D., Lawrenceburg, Ind.
 Dean Hill Pump Co., Anderson, Ind.
 Deming Co., Salem, Ohio
 Gardner-Denver Co., Quincy, Ill.
 Goulds Pump, Inc., Seneca Falls, N. Y.
 Humphryes Mfg. Co., Mansfield, Ohio
 Indiana Pump & Comp. Co., Indianapolis, Ind.
 Ingersoll-Rand Co., New York
 Layne & Bowler, Inc., Memphis, Tenn.
 McDonald Mfg. Co., A. Y., Dubuque, Iowa
 Myers & Bros. Co., F. E., Ashland, Ohio
 Pomona Pump Co., Pomona, Calif.
 Rumsey Pump Co., Seneca Falls, N. Y.
 Sterling Pump Corp., Stockton, Calif.
 Weinman Pump Mfg. Co., Columbus, Ohio
- Pumps, Diaphragm**
 *Construction Machinery Co., Waterloo, Ia.
 *Brown Clutch Co., Sandusky, Ohio
 *Domestic Eng. & Pump Co., Shippensburg, Pa.
 *Dorr Co., New York
 *Jaeger Machine Co., Columbus, Ohio
 *Novo Engine Co., Lansing, Mich.
 Adnan Engg. & Mfg. Co., The Nunda, N. Y.
 Barnes Mfg. Co., Mansfield, Ohio
 Carter Co., Ralph B., Hackensack, N. J.
 Chain Belt Co., Milwaukee, Wis.
 C. H. & E. Mfg. Co., Milwaukee, Wis.
 Deming Co., Salem, Ohio
 Edson Mfg. Corp., South Boston, Mass.
 Goulds Pumps, Inc., Seneca Falls, N. Y.
 Humphryes Mfg. Co., Mansfield, Ohio
 Marlow, A. S., Ridgewood, N. J.
 Waldo Bros. Co., Boston, Mass.
 Witte Engine Works, Kansas City, Mo.
- Pumps, Dredging**
 *Novo Engine Co., Lansing, Mich.
 Ellicott Mach. Corp., Baltimore, Md.
 Erie Pump & Engine Works, Medina, N. Y.
 Lawrence Pump & Engine Co., Lawrence, Mass.
 Morris Machine Works, Baldwinville, N. Y.
- Pumps, Power**
 *Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 *Domestic Eng. & Pump Co., Shippensburg, Pa.
 *Jaeger Machine Co., Columbus, Ohio
 *Kinney Mfg. Co., Boston, Mass.
 *Novo Engine Co., Lansing, Mich.
 *Worthington Pump & Machy. Corp., Harrison, N. J.
- Alamo Iron Works, San Antonio, Texas**
 Aldrich Pump Co., Allentown, Pa.
 American Steam Pump Co., Battle Creek, Mich.
 American Well Works, Aurora, Ill.
 Aurora Pump & Mfg. Co., Aurora, Ill.
 Barnes Mfg. Co., Mansfield, Ohio
 C. H. & E. Mfg. Co., Milwaukee, Wis.
 Chicago Pump Co., Chicago
 Dayton-Dowd Co., Quincy, Ill.
 Dean Bros. Co., Indianapolis, Ind.
 De Laval Steam Turbine Co., Trenton, N. J.
 Deming Co., Salem, Ohio
 Fairbanks, Morse & Co., Chicago
 Gardner-Denver Co., Quincy, Ill.
 Goulds Pumps, Inc., Seneca Falls, N. Y.
 Humphryes Mfg. Co., Mansfield, Ohio
 Ingersoll-Rand Co., New York
 LaBour Co., Inc., Elkhart, Ind.
 Lawrence Pump & Engine Co., Lawrence, Mass.
 Lecourtney Co., Newark, N. J.
 Myers & Bros. Co., F. E., Ashland, Ohio
 Rumsey Pump Co., Seneca Falls, N. Y.
 Weinman Pump Mfg. Co., Columbus, Ohio
 Yeomans Bros. Co., Chicago
- Pumps, Quadruplex**
 *Sterling Machy. Corp., Kansas City, Mo.
- Pumps, Tar and Asphalt**
 *Kinney Mfg. Co., Boston, Mass.
 *Worthington Pump & Machy. Corp., Harrison, N. J.
 Aldrich Pump Co., Allentown, Pa.
 American Steam Pump Co., Battle Creek, Mich.
 Barber Asphalt Co., Philadelphia
 Gardner-Denver Co., Quincy, Ill.
 Goulds Pumps, Inc., Seneca Falls, N. Y.
 Madsen Iron Works, Huntington Park, Calif.
- Pumps, Triplex**
 *Domestic Eng. & Pump Co., Shippensburg, Pa.
 *Jaeger Machine Co., Columbus, Ohio
 *Novo Engine Co., Lansing, Mich.
 *Worthington Pump & Machy. Corp., Harrison, N. J.
 Aldrich Pump Co., Allentown, Pa.
 Barnes Mfg. Co., Mansfield, Ohio
 Buffalo Steam Pump Co., Buffalo, N. Y.
 Chain Belt Co., Milwaukee, Wis.
 C. H. & E. Mfg. Co., Milwaukee, Wis.
 Deming Co., Salem, Ohio
 Goulds Pumps, Inc., Seneca Falls, N. Y.
 Luitweiler Pumping Eng. Co., Rochester, N. Y.
 Platt Iron Works, Dayton, Ohio
 Rumsey Pump Co., Seneca Falls, N. Y.
- Radial Brick Chimneys (See Chimneys)**
- Radiators for Gasoline Engines**
 McCord Radiator Mfg. Co., Detroit, Mich.
 Modine Mfg. Co., Racine, Wis.
 Perfex Corp., Milwaukee, Wis.
 Young Radiator Co., Racine, Wis.
- Rail and Rail Joints**
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie Steel Co., Pittsburgh, Pa.
 Koppel Ind. Car & Equip. Co., Koppel, Pa.
 Sweet's Steel Co., Williamsport, Pa.
- Railway Cars (See Cars)**
- Rams, Hydraulic**
 Deming Co., Salem, Ohio
 Goulds Pumps, Inc., Seneca Falls, N. Y.
 Johnson Mfg. Co., Seattle, Wash.
 Rife Hydraulic Engine Co., New York
 Rumsey Pump Co., Seneca Falls, N. Y.
- Reinforced Concrete Pipe (See Pipe)**
- Reinforcing Fabric for Concrete (See Wire Fabric)**
- Reinforcing Steel for Concrete (See Steel Reinforcing)**
 Relief Valves (See Valves)
 Revolving Derricks (See Derricks)
 Rivet Forges (See Forges)
 Riveted Pipe (See Pipe)
 Riveters, Pneumatic (See Tools, Pneumatic)
 Road Drags (See Drags)
 Road Finishers (See Finishers)
 Road Graders (See Graders)
 Road Maintainers (See Maintainers)
 Road-Mix Machines, Pick-Up
 Barber-Greene Co., Aurora, Ill.
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Road-Mix Machines, Surface
 *Ethyre & Co., Inc., E. D., Oregon, Ill.
 Road Oils (See Oils)
 Road Oilers (See Distributors)
 Road Plows (See Plows)
 Road Rollers (See Rollers)
 Road Scrapers (See Maintainers)
 Rock Asphalt (See Asphalt, Rock)
 Rock Crushers (See Crushers)
 Rock Drills (See Drills)
 Rod Cutters (See Cutters)

If you find any errors or omissions in this Where to Purchase list, please send corrections to

CONTRACTORS AND ENGINEERS MONTHLY

Newark

REINFORCED CONCRETE PIPE
"It makes a better joint"

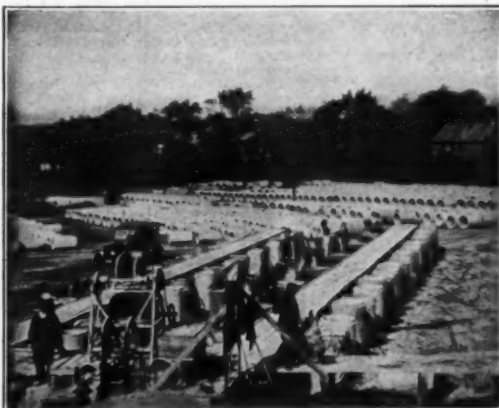
**Easily laid at
small expense
with perfect
flow line.**



NEWARK CONCRETE PIPE COMPANY

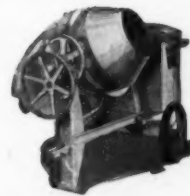
323 Broadway

Newark New Jersey

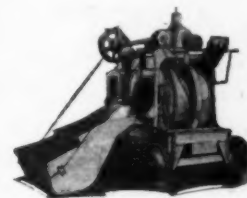


The Most Improved Line!

*In the
Mixer
Field-*



WONDER TILTING MIXERS



MASTER DRUM TYPE MIXERS

ALSO HOISTS — PLASTER MIXERS
SAW RIGS AND PUMPS

CONSTRUCTION MACHINERY CO.
WATERLOO, IOWA

100% Modern

WHERE TO PURCHASE

Rods and Wires, Welding

*American Steel & Wire Co., Chicago
 American Brass Co., Waterbury, Conn.
 American Arc Welders, Roseau, Minn.
 American Manganese Steel Co., Inc., Chicago
 Hts., Ill.
 Atlas Foundry Co., Cleveland, Ohio
 Central Steel & Wire Co., Chicago
 Elec. Arc Cutting & Welding Co., Newark, N.J.
 Fusion Welding Corp., Chicago
 General Electric Co., Schenectady, N. Y.
 Hollup Corp., Chicago
 Koro Corp., Bellwood, Ill.
 Lincoln Electric Co., Cleveland, Ohio
 Linde Air Products Co., The, New York
 Page Steel & Wire Co., Bridgeport, Conn.
 Roebbing's Sons Co., John A., Trenton, N. J.
 Seneca Wire & Mfg. Co., Fostoria, Ohio
 Smith Welding Equip. Corp., Minneapolis
 Steel Sales Corp., Chicago
 Steady Co., Whittier, Calif.
 Wickwire Spencer Steel Co., New York
 Wilson Welder & Metals Co., No. Bergen, N. J.

Rollers, Embankment

*Buffalo-Springfield Roller Co., Springfield, O.
 *Euclid Road Machy. Co., Cleveland, Ohio
 Acme Road Machinery Co., Frankfort, N. Y.
 Kohl & Co., H. W., Los Angeles, Calif.

Rollers, Road and Paving

*Austin-Western Road Machy. Co., Chicago
 *Buffalo-Springfield Roller Co., Springfield, O.
 *Hercules Co., Marion, Ohio
 *Riddell Co., W. A., Bucyrus, Ohio
 Acme Road Machy. Co., Frankfort, N. Y.
 Barber Asphalt Co., Philadelphia
 Beach Mfg. Co., Charlotte, Mich.
 Davenport Loco. & Mfg. Corp., Davenport, Ia.
 Erie Machine Shops, Erie, Pa.
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Good Roads Machy. Co., Kennett Square, Pa.
 Horst & Strietter Co., Davenport, Iowa
 Huber Mfg. Co., Marion, Ohio
 Universal Road Machy. Co., Kingston, N. Y.
 Wehr Co., Oudaky, Wis.

Rollers, Trench

*Trackson Co., Milwaukee, Wis.

Rooter Plows (See Plows)

Ropes, Manila

*Williamsport Wire Rope Co., Williamsport, Pa.
 American Mfg. Co., Brooklyn, N. Y.
 Columbian Rope Co., Auburn, N. Y.
 Cuyler Cordage Co., Brooklyn, N. Y.
 Dobbie Fdy. & Mach. Co., Niagara Falls, N. Y.
 Hooven & Allison Co., Kenia, Ohio
 Hunt Co., Inc., C. W., W. New Brighton, N. Y.
 Kelly Co., R. A., Kenia, Ohio
 New Bedford Cordage Co., New Bedford, Mass.
 Peoria Cordage Co., Peoria, Ill.
 Plymouth Cordage Co., N. Plymouth, Mass.
 Portland Cordage Co., Portland, Ore.
 St. Louis Cordage Mills, St. Louis, Mo.
 Tubbs Cordage Co., San Francisco, Calif.
 Wall Rope Works, New York
 Waterbury Co., New York
 Whitlock Cordage Co., New York

Ropes, Wire

*American Steel & Wire Co., Chicago
 *Williamsport Wire Rope Co., Williamsport, Pa.
 American Cable Co., Inc., New York
 Broderick & Baecom Rope Co., St. Louis, Mo.
 Fischer & Hayes Rope & Steel Co., Chicago
 Green, L. F., Chicago
 Hazard Wire Rope Co., Wilkes-Barre, Pa.
 Leechen & Sons Rope Co., A., St. Louis, Mo.
 Macwhyrte Co., Kenosha, Wis.
 Page Steel & Wire Co., Bridgeport, Conn.
 Roebbing's Sons Co., John A., Trenton, N. J.
 Upson-Walton Co., Cleveland, Ohio
 Wickwire-Spencer Steel Co., New York

Rope Fittings, Wire (See Fittings)

Rotary Scrapers (See Scrapers)

Rubber Block Paving (See Block Paving)

Rubber Tires (See Tires)

Rules, Measuring

Kouff & Esser Co., Hoboken, N. J.
 Lufkin Rule Co., Saginaw, Mich.
 Pease Co., C. F., Chicago
 Westcott Rule Co., Seneca Falls, N. Y.

Salamanders, Coke or Wood-Burning

*General Wheelbarrow Co., Cleveland, Ohio
 *Littleford Bros., Cincinnati, Ohio
 Donley Bros. Co., Cleveland, Ohio
 Durlach Can & Iron Works, Brooklyn, N. Y.
 Honhorst Co., Jos., Cincinnati, Ohio
 Jackson Mfg. Co., Harrisburg, Pa.

Salamanders, Oil-Burning

*Littleford Bros., Cincinnati, Ohio
 Aeroll Burner Co., West New York, N. J.
 American Steel Works, Kansas City, Mo.
 Hauck Mfg. Co., Brooklyn, N. Y.
 Macleod Co., Cincinnati, Ohio
 Mohawk Asph. Heater Co., Schenectady, N. Y.

Sand Dryers (See Dryers)

Sand Spreaders (See Spreaders)

Sand Washers (See Washers)

Saw Rigs, Portable

*Construction Machy. Co., Waterloo, Iowa
 American Floor Surfacing Mach. Co., The,
 Toledo, Ohio
 O. H. & E. Mfg. Co., Milwaukee, Wis.
 Chain Belt Co., Milwaukee, Wis.
 DeWalt Products Co., Leola, Pa.
 Jones Superior Machine Co., Chicago
 Knickerbocker Co., Jackson, Mich.
 Leach Co., Oshkosh, Wis.
 Red Star Products Co., Cleveland, Ohio
 Witte Engine Works, Kansas City, Mo.

Saws, Power, Hand

*Touley Tool Co., Cleveland, Ohio
 Black & Decker Mfg. Co., Towson, Md.
 DeWalt Products Corp., Lancaster, Pa.
 Ingersoll-Rand Co., New York
 Irwin Mfg. Co., Cincinnati, Ohio
 Michel Electric Hand Saw Co., Chicago
 Portable Power Tool Corp., Warsaw, Ind.
 Porter-Cable-Hutchinson Corp., Syracuse, N. Y.
 Reed-Prentiss Corp., Worcester, Mass.
 Skilaw, Inc., Chicago
 Speedway Mfg. Co., Cleveor, Ill.
 Stanley Electric Tool Co., New Britain, Conn.
 Syntrol Co., Pittsburgh, Pa.
 U. S. Electrical Tool Co., The, Cincinnati
 Van Dorn Elec. Tool Co., Baltimore, Md.
 Wappat, Inc., Pittsburgh, Pa.
 Wodack Electric Tool Corp., Chicago

Scaffold Accessories

Expansion Scaffold Clamp Co., Flushing, N. Y.

Scaffolds, Steel, Adjustable

*Toledo Pressed Steel Co., Toledo, Ohio
 Fuller Co., H. B., St. Paul, Minn.
 Steel Scaffolding Co., Evansville, Ind.
 Tilley Ladders Co., Inc., The John, Watervliet,
 N. Y.

Scarifiers

*Austin-Western Road Machy. Co., Chicago
 *Baker Mfg. Co., Springfield, Ill.
 *Blaw-Knox Co., Pittsburgh, Pa.
 *Buffalo-Springfield Roller Co., Springfield, O.
 *Caterpillar Tractor Co., Peoria, Ill.
 *Ehrass & Co., Inc., Chas., New York
 *Riddell Co., W. A., Bucyrus, Ohio
 Acme Road Machy. Co., Frankfort, N. Y.
 Adams Co., J. D., Indianapolis, Ind.
 American Tractor Equip. Co., Oakland, Calif.
 Gallion Iron Works & Mfg. Co., Gallion, O.
 Good Roads Machy. Co., Kennett Square, Pa.
 Huber Mfg. Co., Marion, Ohio
 Rome Mfg. Co., Rome, N. Y.
 Ryan Mfg. Co., Chicago
 Spears-Weiss Machy. Co., Oakland, Calif.
 Universal Road Machy. Co., Kingston, N. Y.
 Western Wheeled Scraper Co., Aurora, Ill.
 Ward Plow Co., Batavia, N. Y.

Scarifiers, Teeth for

*Shunk Mfg. Co., Bucyrus, Ohio
 American Manganese Steel Co., Inc., Chicago
 Hts., Ill.
 Unit Corp. of Amer., Forgings Div., Milwaukee

Scoops, Hand (See Shovels)

Scoops, Horse or Tractor Drawn (See Scrapers,
 Drag; Scrapers, Rotary; or Scrapers,
 Wheeled)

Scoops, Skimmer and Trench (See Shovels,
 Convertible)

Scrapers, Drag (or Pans)

*Austin-Western Road Machy. Co., Chicago
 Adams Co., J. D., Indianapolis, Ind.
 American Steel Scraper Co., Sidney, Ohio
 Chattanooga Wheelbarrow Co., Chattanooga,
 Tenn.
 Harris Co., B. W. & Leo, Minneapolis, Minn.
 Jackson Mfg. Co., Harrisburg, Pa.
 Lansing Co., Lansing, Mich.
 Sidney Steel Scraper Co., Sidney, Ohio
 Slusser-McLean Scraper Co., Sidney, Ohio
 Western Wheeled Scraper Co., Aurora, Ill.

Scrapers, Drag, Power (For use on Dragline Cableways)

*Diamond Iron Works, Inc., Minneapolis, Minn.
 *Hayward Co., New York
 *Sauerman Bros., Chicago
 Beach Mfg. Co., Charlotte, Mich.
 Beaumont Co., R. H., Philadelphia
 Garst Mfg. Co., Chicago
 Green, L. F., Chicago
 Iowa Mfg. Co., Cedar Rapids, Iowa

Scrapers, Dragline (For use on Cranes)

American Manganese Steel Co., Inc., Chicago
 Hts., Ill.
 Browning Crane Co., Cleveland, Ohio
 Bucyrus-Erie Co., So. Milwaukee, Wis.

Bucyrus-Monaghan Co., Chicago
 Erie Steel Const. Co., Erie, Pa.
 Harnischfeger Corp., Milwaukee, Wis.
 Link-Belt Co., Chicago
 Page Engineering Co., Chicago

Scrapers, Fresno (See Scrapers, Rotary)

Scrapers, Road (See Maintainers)

Scrapers, Rotary

*Austin-Western Road Machy. Co., Chicago
 *Baker Mfg. Co., Springfield, Ill.
 *Euclid Road Machy. Co., Cleveland, Ohio
 *Farm Tools, Inc., Mansfield, Ohio
 *General Wheelbarrow Co., Cleveland, Ohio
 *La-Plante-Chouteau Mfg. Co., Inc., Cedar Rapids,
 Iowa
 *Schaefer Co., Gustav, Cleveland, Ohio
 Adams Co., J. D., Indianapolis, Ind.
 American Steel Scraper Co., Sidney, Ohio
 Atlas Scraper Co., Los Angeles, Calif.
 Beach Mfg. Co., Charlotte, Mich.
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Harris Co., B. W. & Leo, Minneapolis, Minn.
 Killefer Mfg. Corp., Los Angeles, Calif.
 Lansing Co., Lansing, Mich.
 Sidney Steel Scraper Co., Sidney, Ohio
 Slusser-McLean Scraper Co., Sidney, Ohio
 Solano Iron Works, Berkeley, Calif.
 Western Wheeled Scraper Co., Aurora, Ill.
 Ward Plow Co., Batavia, N. Y.

Scrapers, Self-Loading (See Scrapers, Rotary; Scrapers, Wheeled)

Scrapers, Wheeled

*Austin-Western Rd. Machy. Co., Chicago
 *Baker Mfg. Co., Springfield, Ill.
 *Euclid Road Machy. Co., Cleveland, Ohio
 *General Wheelbarrow Co., Cleveland, Ohio
 *Riddell Co., W. A., Bucyrus, Ohio
 Acme Road Machy. Co., Frankfort, N. Y.
 Adams Co., J. D., Indianapolis, Ind.
 American Steel Scraper Co., Sidney, Ohio
 Atlas Scraper Co., Los Angeles, Calif.
 Beach Mfg. Co., Charlotte, Mich.
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Harris Co., B. W. & Leo, Minneapolis, Minn.
 Highway Trailer Co., Edgerton, Wis.
 Lansing Co., Lansing, Mich.
 Miami Trailer Scraper Co., Troy, Ohio
 Miskin Scraper Works, Ucon, Idaho
 Shaw Exc. & Tools Co., Worthington, Ohio
 Sidney Steel Scraper Co., Sidney, Ohio
 Slusser-McLean Scraper Co., Sidney, Ohio
 Western Wheeled Scraper Co., Aurora, Ill.
 Willamette-Ersted Co., Portland, Ore.

Screeds, Hand

*Heltzel Steel Form & Iron Co., Warren, O.

Screens, Sand and Gravel

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 *Austin-Western Road Machy. Co., Chicago
 *Diamond Iron Works, Inc., Minneapolis, Minn.
 *Littleford Bros., Cincinnati, Ohio
 *Pioneer Gravel Equip. Mfg. Co., Minneapolis
 Acme Road Machy. Co., Frankfort, N. Y.
 Atlas Engg. Co., Clintonville, Wis.
 Barber-Greene Co., Aurora, Ill.
 Bartlett & Snow Co., O. O., Cleveland, Ohio
 Beach Mfg. Co., Charlotte, Mich.
 Chain Belt Co., Milwaukee, Wis.
 Chicago Automatic Conv. Co., Chicago
 Deister Concentrator Co., Ft. Wayne, Ind.
 Gifford-Wood Co., Hudson, N. Y.
 Good Roads Machy. Co., Kennett Square, Pa.
 Hais Mfg. Co., Geo., New York
 Hendrick Mfg. Co., Carbondale, Pa.
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Jeffrey Mfg. Co., Columbus, Ohio
 Link-Belt Co., Chicago, Ill.
 Merriman Asphalt Plant, Inc., Lima, Ohio
 Morrow Mfg. Co., Wellston, Ohio
 Neff & Fry Co., Camden, Ohio
 New England Road Machy. Co., South Boston,
 Mass.
 New Holland Machine Co., New Holland, Pa.
 New Jersey Wire Cloth Co., Trenton, N. J.
 Robins Conv. Belt Co., New York
 Rogers Iron Works Co., Joplin, Mo.
 Sackett Screen & Chute Co., H. B., Chicago
 Smith Engineering Works, Milwaukee, Wis.
 Stephens-Adamson Mfg. Co., Aurora, Ill.
 W. Toepfer & Sons Co., Milwaukee, Wis.
 Traylor Engg. & Mfg. Co., Allentown, Pa.
 United Iron Works, Kansas City, Mo.
 Universal Crusher Co., Cedar Rapids, Iowa
 Universal Road Machy. Co., Kingston, N. Y.
 Webster & Waller Mfg. Co., Chicago
 Weimer Co., H. W., Milwaukee, Wis.
 Western Wheeled Scraper Co., Aurora, Ill.

Semi-Trailers (See Trailers)

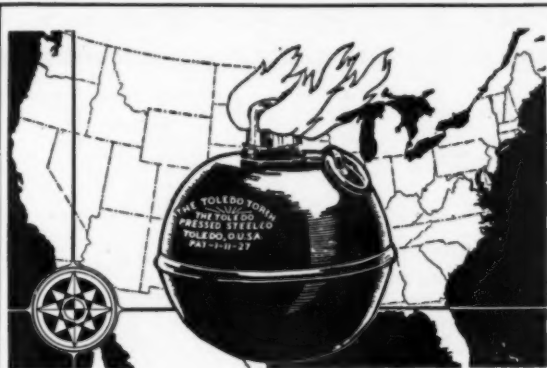
Sewer Blocks, Segment (See Blocks)

Sewer Castings (See Castings)

Sewer Pipe (See Pipe, Concrete, Vitrified Clay or Cast Iron)

Sewer Pipe Joint Compounds (See Compounds)

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover *



The Toledo Torch

From Maine to California, Toledo Torches are used by the man who really knows what safety lights are for.

the safety light most widely used because it is the greatest value



The Toledo Pressed Steel Co.
TOLEDO OHIO

Save with Steel

Manufacturers of The Toledo Horse—the ideal highway barricade



Announcing

... **W**E have purchased the Clam Shell and Dragline Bucket and Heavy-Duty Trailer business of the G. H. Williams Company. Williams *extra yardage* buckets—built in sizes and types to meet any requirement—used by successful contractors everywhere—will continue to be marketed under their well-known trade-name—

WILLIAMS

FAST-DIGGING BUCKETS



THE WELLMAN ENGINEERING CO.

7012 Central Ave., Cleveland, Ohio

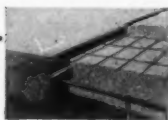
TRUSCON The Most Complete Line Products for Reinforcing Roads and Pavements



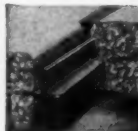
Curb Bar



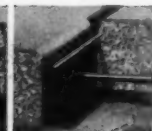
Steel Post



Contraction Plate



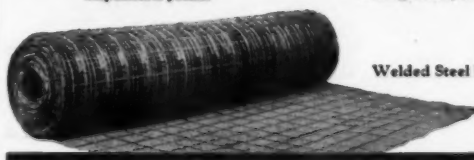
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Road Forms

New improvements, simplified placing and greater strength. Perfect alignment assured under all conditions due to special design of lock joint. All Truscon Road Forms are completely interchangeable with each other, regardless of height.

Write for catalog and prices
TRUSCON STEEL COMPANY
Youngstown, Ohio



Welded Steel Fabric

WHERE TO PURCHASE

Sharpeners, Drill-Steel

- *Hardacog Wender Drill Co., Ottumwa, Iowa
- *Schramm, Inc., West Chester, Pa.
- Gardner-Denver Co., Quincy, Ill.
- Ingersoll-Rand Co., New York
- Lake Shore Engine Works, Marquette, Mich.
- Sullivan Machinery Co., Chicago

Sheet Steel Piling (See Piling)

Sheeting Drivers (See Hammers)

Shores

- Concrete Engg. Co., Omaha, Neb.
- Dayton Sore Grip & Shore Co., Dayton, Ohio
- M. & M. Wire Clamp Co., Minneapolis, Minn.
- O. D. G. Co., Owensboro, Ky.
- Red Star Products Corp., Cleveland, Ohio
- Ross Co., H. W., Cincinnati, Ohio
- Ross-Meyer-Hecht Co., Cincinnati, Ohio
- Synona Clamp & Mfg. Co., Chicago
- Toledo Steel Tube Co., Toledo, Ohio
- Universal Form Clamp Co., Chicago

Shovels, Convertible

- *Bay City Shovels, Inc., Bay City, Mich.
- *General Excavator Co., Marion, Ohio
- *Keystone Driller Co., Beaver Falls, Pa.
- *Michigan Power Shovel Co., Benton Harbor, Mich.

- *National Equip. Corp., Milwaukee, Wis.
- *Ohio Locomotive Crane Co., Bucyrus, Ohio
- *Osgood Co., Marion, Ohio
- American Hoist & Derrick Co., St. Paul, Minn.
- Austin Machinery Corp., Muskegon, Mich.
- Buckeye Traction Ditcher Co., Findlay, Ohio
- Bucyrus-Erie Co., So. Milwaukee, Wis.
- Byers Mach. Co., Indiana, Ohio
- Inslay Mfg. Co., Indianapolis, Ind.
- Manitowoc Eng. Works, Manitowoc, Wis.
- Mead-Morrison Mfg. Co., Boston, Mass.
- Northwest Engineering Co., Chicago
- Ohio Power Shovel Co., Lima, Ohio
- Orion Crane & Shovel Co., Chicago
- Pontiac Tractor Co., Pontiac, Mich.
- Speeder Machy. Corp., Cedar Rapids, Iowa
- Star Drilling Machine Co., Akron, Ohio
- Thew Shovel Co., Lorain, Ohio

Shovels, Diesel

- *National Equip. Corp., Milwaukee, Wis.
- *Osgood Co., Marion, Ohio
- Bucyrus-Erie Co., So. Milwaukee, Wis.
- Harnischfeger Corp., Milwaukee, Wis.
- Industrial Brownhoist Corp., Cleveland, O.
- Klauser Mfg. Co., Dubuque, Iowa
- Link-Belt Co., Chicago
- Marion Steam Shovel Co., Marion, Ohio
- Ohio Power Shovel Co., Lima, Ohio
- Speeder Machy. Corp., Cedar Rapids, Iowa

Shovels, Electric

- *Bay City Shovels, Inc., Bay City, Mich.
- *General Excavator Co., Marion, Ohio
- *National Equip. Corp., Milwaukee, Wis.
- *Osgood Co., Marion, Ohio
- American Hoist & Derrick Co., St. Paul, Minn.
- Bucyrus-Erie Co., So. Milwaukee, Wis.
- Buckeye Traction Ditcher Co., Findlay, Ohio
- Harnischfeger Corp., Milwaukee, Wis.
- Industrial Brownhoist Corp., Cleveland, Ohio
- Link-Belt Co., Chicago
- Manitowoc Eng. Works, Manitowoc, Wis.
- Marion Steam Shovel Works, Marion, Ohio
- Mead-Morrison Mfg. Co., Boston, Mass.
- Northwest Engineering Co., Chicago
- Ohio Power Shovel Co., Lima, Ohio
- Speeder Machy. Corp., Cedar Rapids, Iowa
- Thew Shovel Co., Lorain, Ohio

Shovels, Gasoline

- *Bay City Shovels, Inc., Bay City, Mich.
- *General Excavator Co., Marion, Ohio
- *Keystone Driller Co., Beaver Falls, Pa.
- *National Equip. Corp., Milwaukee, Wis.
- *Ohio Locomotive Crane Co., Bucyrus, Ohio
- *Osgood Co., Marion, Ohio
- *Trackson Co., Milwaukee, Wis.
- American Hoist & Derrick Co., St. Paul, Minn.
- Buckeye Traction Ditcher Co., Findlay, Ohio
- Bucyrus-Erie Co., So. Milwaukee, Wis.
- Byers Machine Co., Ravenna, Ohio
- Fundom Hoist & Shovel Co., Lima, Ohio
- Harnischfeger Corp., Milwaukee, Wis.
- Industrial Brownhoist Corp., Cleveland, Ohio
- Inslay Mfg. Co., Indianapolis, Ind.
- Link-Belt Co., Chicago
- Manitowoc Eng. Works, Manitowoc, Wis.
- Marion Steam Shovel Co., Marion, Ohio
- Mead-Morrison Mfg. Co., Boston, Mass.
- Northwest Engg. Co., Chicago
- Ohio Power Shovel Co., Lima, Ohio
- Orion Crane & Shovel Co., Chicago
- Speeder Machy. Corp., Cedar Rapids, Iowa
- Star Drilling Machine Co., Akron, Ohio
- Thew Shovel Co., Lorain, Ohio
- Universal Power Shovel Co., Milwaukee, Wis.

Shovels, Spades and Scoops, Hand

- American Mfg. Co., Chattanooga, Tenn.
- Ames-Baldwin Wyoming Shovel Co., North Easton, Mass.
- Baldwin Tool Works, Parkersburg, W. Va.
- Beall Bros., Alton, Ill.
- Connecant Shovel Co., Connecant, Ohio
- Indiana Shovel Co., New Castle, Ind.
- Jackson Shovel Co., Montpelier, Ind.
- Wood Shovel & Tool Co., Piqua, Ohio

Shovels, Steam

- *Keystone Driller Co., Beaver Falls, Pa.
- *Osgood Co., Marion, Ohio
- American Hoist & Derrick Co., St. Paul, Minn.
- Bucyrus-Erie Co., So. Milwaukee, Wis.
- Industrial Brownhoist Corp., Cleveland, O.
- Marion Steam Shovel Co., Marion, Ohio
- Orion Crane & Shovel Co., Chicago
- Thew Shovel Co., Lorain, Ohio

Shovels, Tractor-Mounted

- *Austin-Western Road Machy. Co., Chicago
- *Bay City Shovels, Inc., Bay City, Mich.
- *Michigan Power Shovel Co., Benton Harbor, Mich.

- *Trackson Co., Milwaukee, Wis.
- Blair Mfg. Co., W. M., Chicago
- Clark Tractor Co., Battle Creek, Mich.
- Miami Trailer-Scraper Co., Troy, Ohio
- Nordberg Mfg. Co., Milwaukee, Wis.
- Resistor Engg. Corp., Muskegon, Okla.

Sidewalk Forms (See Forms)

Silicate of Soda

- Grasselli Chemical Co., Cleveland, Ohio
- Philadelphia Quartz Co., Philadelphia
- Standard Silicate Co., Cincinnati, Ohio

Snow Fence (See Fence)

Snow Plow Blades (See Blades)

Snow Removal Machinery (See also Graders.

Tractors and Trucks)

- *Baker Mfg. Co., Springfield, Ill.
- *Burch Corp., The, Crestline, Ohio
- *La-Plante-Chaste Mfg. Co., Inc., Cedar Rapids, Iowa
- *Nelson Iron Works, W. P., Passaic, N. J.
- Barber-Greene Co., Aurora, Ill.
- Batavia Steel Plate Const. Co., Batavia, N. Y.
- Clark Tractor Co., Battle Creek, Mich.
- Detroit Harvester Co., Detroit, Mich.
- Empire Plow Co., Cleveland, Ohio
- Fox Rotary Snow Broom Co., New York
- Frink, Carl H., Clayton, Thousand Is., N. Y.
- Good Roads Machy. Co., Kennett Square, Pa.
- Haisa Mfg. Co., Geo., New York
- Heil Co., The, Milwaukee, Wis.
- Klauser Mfg. Co., Dubuque, Iowa
- Maine Steel Prods. Co., So. Portland, Maine
- Rotary Snow Plow Co., Minneapolis, Minn.
- Walsh's Holyoke Sil. Br. Wks., Holyoke, Mass.
- Walter Motor Truck Co., L. I. City, N. Y.
- Wausau Iron Works, Wausau, Wis.
- Western Wheeled Scraper Co., Aurora, Ill.

Spaders, Pneumatic (See Tools, Pneumatic)

Spades (See Shovels)

Spiral Pipe (See Pipe)

Sprayers, Asphalt and Tar, Hand

- *Chausse Oil Burner Co., Elkhart, Ind.
- *Connery & Co., Inc., Philadelphia
- *Kinney Mfg. Co., Boston, Mass.
- *Littleford Bros., Cincinnati, Ohio
- Aeroll Burner Co., West New York, N. J.
- Mohawk Asphalt Heater Co., Schenectady, N. Y.
- Spears-Wellis Machy. Co., Oakland, Calif.

Sprayers, Asphalt Emulsion, Hand and Power

- *Littleford Bros., Cincinnati, Ohio
- Barber Asphalt Co., Philadelphia
- Colas Roads, Inc., Boston
- Hauk Mfg. Co., Brooklyn, N. Y.
- Sacramento Engg. & Mach. Works, Sacramento, Calif.
- Tarrant Mfg. Co., Saratoga Springs, N. Y.

Spray Painting Machinery (See Painting Machinery)

Spreaders, Asphalt

- *Burch Corp., The, Crestline, Ohio

Spreaders, Calcium Chloride

- *Solway Sales Corp., New York
- Adnun Engg. & Mfg. Co., The, Nunda, N. Y.

Spreaders, Sand and Chip

- *Hvaas & Co., Inc., Chas., New York
- Adnun Engg. & Mfg. Co., The, Nunda, N. Y.
- France Foundry & Machine Co., N. Hamilton, Ohio
- Good Roads Machy. Co., Kennett Square, Pa.
- Goroco Mechanical Spreader Co., Philadelphia
- Highway Service, Inc., New Bedford, Mass.
- Tarrant Mfg. Co., Saratoga Springs, N. Y.
- Universal Road Machy. Co., Kingston, N. Y.
- Warren Bros. Roads Co., Boston, Mass.

Spreaders, Stone

- *Austin-Western Road Machy. Co., Chicago
- *Burch Corp., The, Crestline, Ohio
- *Hvaas & Co., Inc., Chas., New York
- Adnun Engg. & Mfg. Co., The, Nunda, N. Y.
- Gallion Iron Works & Mfg. Co., Gallion, Ohio
- Goroco Mechanical Spreader Co., Philadelphia
- Highway Service, Inc., New Bedford, Mass.
- Merriman Asph. Plant, Inc., Lima, Ohio
- Universal Road Machy. Co., Kingston, N. Y.

Stacks, Steel (See Chimneys)

Starting Systems (See Ignition Systems)

Steam Shovels (See Shovels)

Steel, Drill, Hollow

- Paragon Sil. & Tool Co., E. Rutherford, N. J.
- S K F Steels, Inc., New York
- Swedish-American Steel Corp., Brooklyn, N. Y.

United Alloy Steel Corp., Canton, Ohio

Vulcan Tool Mfg. Co., Quincy, Mass.

Steel, Reinforcing, for Concrete

- *Truscon Steel Co., Youngstown, Ohio
- Carnegie Steel Co., Pittsburgh, Pa.
- Concrete Steel Co., New York
- Laclede Steel Co., St. Louis, Mo.
- Milton Mfg. Co., Milton, Pa.
- Ryerson & Son, Inc., Jos. T. Chicago

Steel, Structural

- *Blaw-Knox Co., Pittsburgh, Pa.
- American Bridge Co., New York
- Bellefontaine Br. & Sil. Co., Bellefontaine, O.
- Bethlehem Steel Co., Bethlehem, Pa.
- Carnegie Steel Co., Pittsburgh, Pa.
- Central States Br. Co., Indianapolis, Ind.
- Champion Bridge Co., Wilmington, Ohio
- Clinton Bridge Works, Clinton, Iowa
- Eastern Bridge & Struc. Co., Worcester, Mass.
- Fort Pitt Bridge Works, Pittsburgh, Pa.
- Ingalis Iron Works Co., Birmingham, Ala.
- Inter. Steel & Iron Co., Evansville, Ind.
- Lakeide Bridge & Steel Co., Louisville, Ky.
- McClintic-Marshall Co., Pittsburgh, Pa.
- Milwaukee Bridge Co., Milwaukee, Wis.
- Minneapolis-Moline Power Impl. Co., Minn.
- Missouri Vy. Br. & Ir. Co., Leavenworth, Kans.
- Mt. Vernon Bridge Co., Mt. Vernon, Ohio
- Ohio Struc. Steel Co., Newton Falls, Ohio
- Penn Bridge Co., Beaver Falls, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
- Richmond Struc. Steel Co., Richmond, Va.
- Ryerson & Son, Inc., Jos. T., Chicago
- Virginia Br. & Iron Co., Roanoke, Va.
- Wheeling Struc. Steel Co., Wheeling, W. Va.
- Wisconsin Bridge & Iron Co., No. Milwaukee, Wis.

Steel Buildings (See Buildings)

Steel Castings (See Castings)

Steel Chimneys (See Chimneys)

Steel Derricks (See Derricks)

Steel Pipe (See Pipe)

Steel Products, Manganese

- *Riddell Co., W. A., Bucyrus, Ohio
- American Manganese Steel Co., Inc., Chicago
- Hts., Ill.
- Republic Steel Corp., Youngstown, Ohio
- Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Steel Sheet Piling (See Piling)

Steel Tanks (See Tanks)

Stiffing Derricks (See Derricks)

Stone Spreaders (See Spreaders)

Storage Bins (See Bins)

Straightedges

- *Belitel Steel Form & Iron Co., Warren, O.
- *Lakewood Engg. Co., Columbus, Ohio
- Cleveland Formgrader Co., The, Cleveland, O.

Street Castings (See Castings)

Structural Steel (See Steel)

Stump Pullers (See Pullers)

Subgraders

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Belitel Steel Form & Iron Co., Warren, Ohio
- *Lakewood Engg. Co., Columbus, Ohio
- *National Equip. Corp., Milwaukee, Wis.
- Cleveland Formgrader Co., The, Cleveland, O.
- Hug Co., The, Highland, Ill.

Surface Heaters, Asphalt (See Heaters)

Surfactors and Grinders, Concrete

- *Concrete Surfacing Machy. Co., Cincinnati, O.
- *Tousley Tool Co., Cleveland, Ohio
- Chicago Pneumatic Tool Co., New York
- Cleveland Pne. Tool Co., Cleveland, O.
- Dalzell Co., The, Philadelphia, Pa.
- Ingersoll-Rand Co., New York

Surveying Instruments (See Instruments)

Tampers, Pneumatic (See Tools, Pneumatic)

Tanks, Air Compressor

- *Connery & Co., Inc., Philadelphia
- *Littleford Bros., Cincinnati, Ohio
- *Schramm, Inc., West Chester, Pa.
- *Worthington Pump & Machy. Corp., Harrison, N. J.
- Biggs Boiler Works, Akron, Ohio
- Chicago Bridge & Iron Works, Chicago
- Chicago Pneumatic Tool Co., New York
- Graver Tank & Mfg. Co., East Chicago, Ind.
- Heil Co., Milwaukee, Wis.
- Ingersoll-Rand Co., New York
- Lancaster Iron Works, Lancaster, Pa.
- National Tube Co., Pittsburgh, Pa.
- Petroleum Iron Works Co., Sharon, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh
- Scaife & Sons, W. B., Pittsburgh, Pa.
- Stover Steel Tank & Mfg. Co., Freeport, Ill.
- Westinghouse Trac. Brake Co., Wilmerding, Pa.
- Youngstown Br. & Tank Co., Youngstown, O.

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Beatrice Stl. Tank Mfg. Co., Beatrice, Neb.
Biggs Boiler Works, Akron, Ohio
Birmingham Tank Co., Birmingham, Ala.
Bowser & Co., Inc., S. F., Ft. Wayne, Ind.
Burnham Boiler Corp., Irvington, N. Y.
Caldwell Co., W. E., Louisville, Ky.
Chicago Bridge & Iron Works, Chicago
Columbian Steel Tank Co., Kansas City, Mo.
Graver Tank & Mfg. Co., East Chicago, Ind.
Heil Co., Milwaukee, Wis.
Lancaster Iron Works, Inc., Lancaster, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh
Road Supply & Metal Co., Topeka, Kans.
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.
Wayne Co., Ft. Wayne, Ind.

Tanks, Steel

*Connery & Co., Philadelphia
*Littleford Bros., Cincinnati, Ohio
Beatrice Steel Tank Mfg. Co., Beatrice, Neb.
Biggs Boiler Works, Akron, Ohio
Birmingham Tank Co., Birmingham, Ala.
Bowser & Co., Inc., S. F., Ft. Wayne, Ind.
Burnham Boiler Corp., Irvington, N. Y.
Butler Mfg. Co., Minneapolis, Minn.
Caldwell Co., W. E., Louisville, Ky.
Chattanooga Bldg. & Tk. Co., Chattanooga
Chicago Bridge & Iron Works, Chicago
Cole Mfg. Co., N. D., Newman, Ga.
Columbian Steel Tank Co., Kansas City, Mo.
Dover Boiler Works, New York
Edwards Mfg. Co., Cincinnati, Ohio
Farrell Mfg. Co., Joliet, Ill.
Graver Tank & Mfg. Co., E. Chicago, Ind.
Hardesty Mfg. Co., R., Denver, Colo.
Heil Co., Milwaukee, Wis.
Hendrick Mfg. Co., Carbondale, Pa.
Honhorst & Co., Cincinnati, O.
Lancaster Iron Works, Lancaster, Pa.
McClintic-Marshall Co., Pittsburgh, Pa.
N. Y. Central Ir. Wks. Co., Hagerstown, Md.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh
Road Supply & Metal Co., Topeka, Kansas
Seafie & Sons, W. B., Pittsburgh, Pa.
United Iron Works, Inc., Kansas City, Mo.
Youngtown Boiler & Tank Co., Youngstown, O.

Tanks, Wood

Acme Tank Co., New York
Beatrice Steel Tank Mfg. Co., Beatrice, Neb.
Caldwell Co., W. E., Louisville, Ky.
Davis & Son, G. M., Palatka, Fla.
Eagle Tank Co., Chicago
Hauser-Stander Tank Co., Cincinnati, Ohio
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.
National Tk. & Pipe Co., Portland, Ore.
Pacific Tank & Pipe Co., San Francisco, Calif.
Redwood Mfrs. Co., San Francisco, Calif.
Stearns Lumber Co., A. T., Boston, Mass.
U. S. Wind Eng. & Pump Co., Batavia, Ill.
Wendnagel & Co., Chicago

Tapes, Steel and Cloth

Dietsgen Co., Eugene, New York
Kunzel & Esser Co., Hoboken, N. J.
Lufkin Rule Company, Saginaw, Mich.
Starrett Co., The L. S., Athol, Mass.

Tar

Barrett Co., New York
Koppers Products Co., Pittsburgh, Pa.

Tarpaulin

Canvas Products Co., St. Louis, Mo.
Daniels, Inc., C. R., New York
Fulton Bag & Cotton Mills, Atlanta, Ga.
Goss Co., J. C., Detroit, Mich.

Tents

Canvas Products Co., St. Louis, Mo.
Compac Tent Corp., Indianapolis, Ind.
Daniels, Inc., C. R., New York
Meyer & Co., L. M., Springfield, Mass.
Fulton Bag & Cotton Mills, Atlanta, Ga.

Testers, Subgrade

*Heltzel Steel Form & Iron Co., Warren, O.
*Lakewood Engg. Co., Columbus, Ohio

Testing Laboratories (See Directory in this issue)

Thawing Torches (See Torches)

Threaders, Pipe

Armstrong Mfg. Co., Bridgeport, Conn.
Borden Co., Warren, Ohio
Jarecki Mfg. Co., Erie, Pa.
Oster Mfg. Co., Cleveland, Ohio
Toledo Pipe Threading Mach. Co., Toledo, O.
Williams Tool Corp., Cleveland, Ohio

Ties, Bar

Symons Clamp & Mfg. Co., Chicago
Union Steel Products Co., Albion, Mich.

Ties, Form (See Clamps and Ties, Form)

Ties, Steel

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Easton Car & Const. Co., Easton, Pa.
International Steel Tie Co., Cleveland, Ohio
Koppel Ind. Car & Equip. Co., Koppel, Pa.
Sweet's Steel Co., Williamsport, Pa.

Ties, Wall

Berger Mfg. Co., Canton, Ohio
Concrete Steel Co., New York
Consolidated Exp. Metal Co., Wheeling, W. Va.
Donley Bros. Co., Cleveland, Ohio
Everett & Co., R. B., Houston, Texas
Milwaukee Corr. Co., Milwaukee, Wis.
M. & M. Wire Clamp Co., Minneapolis, Minn.
Reeves Mfg. Co., Dover, Ohio
Wedgit Tie Co., Inc., New York

Tile, Drainage

American Vitified Prod. Co., Akron, Ohio
Dee Co., Wm. E., Chicago, Ill.
Dickey Mfg. Co., W. S., Kansas City, Mo.
Evans & Howard Fire Brick Co., St. Louis
Minnesota Pipe & Tile Co., Mankato, Minn.
National Drain Tile Co., Terre Haute, Ind.

Tires, Rubber

Dunlap Tire & Rub. Corp. of Amer., Buffalo, N. Y.
Firestone Tire & Rubber Co., Akron, O.
Fisk Tire Co., Chicopee Falls, Mass.
General Tire & Rubber Co., Akron, Ohio
Goodrich Rubber Co., B. F., Akron, Ohio
Goodyear Tire & Rubber Co., Akron, Ohio
Hood Rubber Prod. Co., Inc., Watertown, Mass.
Kelly-Springfield Tire Co., New York
U. S. Tire Co., New York

Tool Houses (See Buildings)

Tools (See various classifications, such as Branding Tools, etc.)

Tools, Pneumatic

*Hardsoc Wonder Drill Co., Ottumwa, Iowa
*McKiernan-Terry Corp., New York
*Schramm, Inc., West Chester, Pa.
*Touley Tool Co., Cleveland, Ohio
Buhl Co., The, Chicago
Chicago Pneumatic Tool Co., New York
Cleveland Pneumatic Tool Co., Cleveland, O.
Dayton Pneumatic Tool Co., Dayton, Ohio
Gardner-Whitcomb Co., Quincy, Ill.
Gilman Mfg. Co., E. Boston, Mass.
Helwig Mfg. Co., St. Paul, Minn.
Independent Foun. Tool Co., Chicago
Ingersoll-Rand Co., New York
Keller, Inc., Wm. H., Grand Haven, Mich.
Sullivan Machinery Co., Chicago

Torches, Blow

American Steel Works, Kansas City, Mo.
Everhot Mfg. Co., Maywood, Ill.
Hauck Mfg. Co., Brooklyn, N. Y.
Milburn Co., Alexander, Baltimore, Md.
Prest-O-Lite Co., Inc., New York
Williams Co., G. H., Erie, Pa.

Torches, Cutting and Welding (See Welding Apparatus)

Torches, Thawing and Heating

*Chausse Oil Burner Co., Elkhart, Ind.
*Connery & Co., Philadelphia
*Littleford Bros., Cincinnati, Ohio
Aerol Burner Co., West New York, N. J.
American Steel Works, Kansas City, Mo.
Hauck Mfg. Co., Brooklyn, N. Y.
MacLeod Co., Cincinnati, Ohio
Mohawk Asph. Heater Co., Schenectady, N. Y.

Torches, Warning

*Consolidated Ir-St. Mfg. Co., Cleveland, O.
*Toledo Pressed Steel Co., Toledo, Ohio

Tower Hoists (See Hoists)

Towers, Concrete Placing (See Chutes and Towers)

Tracks, Industrial and Portable

*Lakewood Engg. Co., Columbus, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., Carnegie, Pa.
Easton Car & Const. Co., Easton, Pa.
Gregg Co., Ltd., Hackensack, N. J.
Hunt Co., Inc., O. W., W. W. Brighton, N. Y.
Insley Mfg. Co., Indianapolis, Ind.
Koppel Ind. Car & Equip. Co., Koppel, Pa.
Sweet's Steel Co., Williamsport, Pa.
St. Louis Frog & Switch Co., St. Louis, Mo.

Traction Treads (See Treads)

Tractor Hitches (See Hitches)

Tractor Shovels (See Shovels)

Tractors

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
*Caterpillar Tractor Co., Peoria, Ill.
*Cleveland Tractor Co., Cleveland, Ohio
*International Harvester Co., Chicago
Case Co., J. I., Racine, Wis.
Clark Tractor Co., Battle Creek, Mich.
Foote Bros. Gear & Machine Co., Chicago
Linn Mfg. Co., Morris, N. Y.
Lombard Tractor & Truck Corp., New York
Mead-Morrison Mfg. Co., E. Boston, Mass.
Minneapolis-Moline Power Impl. Co., Minn.
National Brake & Elec. Co., Milwaukee, Wis.
Sterling Tractor Equip. Co., Brooklyn, N. Y.
Yuba Mfg. Co., San Francisco, Calif.

Trailers and Semi-Trailers

*Bay City Shovels, Inc., Bay City, Mich.
*Hvass & Co., Inc., Chas., New York
*La-Plante-Chaste Mfg. Co., Inc., Cedar Rapids, Iowa
*Rogers Bros. Corp., Albion, Pa.
*Schaefer Co., Gustav, Cleveland, Ohio
*Wellman Engineering Co., The, Cleveland, O.
Clark Tractor Co., Battle Creek, Mich.
Detroit Trailer & Mach. Co., Detroit, Mich.
Eagle Wagon Works, Auburn, N. Y.
Easton Car & Const. Co., Easton, Pa.
Electric Wheel Co., Quincy, Ill.
Fruehauf Trailer Co., Detroit, Mich.
Highway Trailer Co., Edgerton, Wis.
Imperial Machine Co., Minneapolis, Minn.
Miami Trailer-Scrapper Co., Troy, Ohio
Muskegon Iron Works, Muskegon, Okla.
Rex-Watson Corp., Canastota, N. Y.
Streich & Bros. Co., A., Oshkosh, Wis.
Trailmobile Co., Cincinnati, Ohio
Troy Trailer & Wagon Co., Troy, Ohio
Whitehead & Kales Co., Detroit, Mich.
Winsor Tractor Equip. Corp., Ann Arbor, Mich.

Trailers, Heavy Machinery

*Bay City Shovels, Inc., Bay City, Mich.
*Hvass & Co., Inc., Chas., New York
*Rogers Bros. Corp., Albion, Pa.
*Wellman Engineering Co., The, Cleveland, O.
Acme Road Machy. Co., Frankfort, N. J.
Arcadia Trailer Corp., Newark, N. J.
Electric Wheel Co., Quincy, Ill.
Highway Trailer Co., Edgerton, Wis.
Miami Trailer-Scrapper Co., Troy, Ohio
Winsor Tractor Equip. Corp., Ann Arbor, Mich.

Tramways, Aerial

*American Steel & Wire Co., Chicago
*Williamsport Wire Rope Co., Chicago, Ind.
Bedford Fdy. & Machine Co., Bedford, Ind.
Leschen & Sons Rope Co., A., St. Louis, Mo.

Transformers, Electric

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Brown Boveri Elec. Corp., Camden, N. J.
Duncan Elec. Mfg. Co., Lafayette, Ind.
General Electric Co., Schenectady, N. Y.
Kuhlman Electric Co., Bay City, Mich.
Sangamo Electric Co., Springfield, Ill.
Wagner Electric Corp., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh

Treads, Crawler

*Jaeger Machine Co., Columbus, Ohio
*Moon Track Co., Chicago
*Eldell Co., W. A., Bucyrus, Ohio
*Trackson Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Hgts., Ill.
Electric Wheel Co., Quincy, Ill.
Peerless Track Co., St. Joseph, Mich.
Rex-Watson Corp., Canastota, N. Y.
Truktor Corp., Newark, N. J.
Wehr Co., Milwaukee, Wis.

Trench Braces (See Braces)

Trench Excavators (See Excavators and also Shovels)

Trench Pumps (See Pumps)

Trench Rollers (See Rollers)

Triplex Pumps (See Pumps)

Truck Bodies, Concrete (See Bodies)

Truck Cranes (See Cranes)

Trucks, Cement Bag

American Pulley Co., Philadelphia
Anchor Post Fence Co., Baltimore, Md.
Case Crane & Eng. Co., Columbus, Ohio
Clark Co., Geo. F., Windsor Locks, Conn.
Electric Wheel Co., Quincy, Ill.
Fairbanks Co., New York

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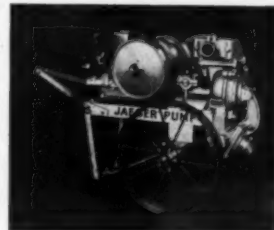
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 Autocar Co., Ardmore, Pa.
 Brockway Motor Truck Co., Cortland, N. Y.
 Chevrolet Motor Co., Flint, Mich.
 Clydesdale Motor Truck Co., Clyde, Ohio
 Diamond T Motor Car Co., Chicago
 Dodge Bros. Corp., Detroit, Mich.
 Duplex Truck Co., Lansing, Mich.
 Fageol Motors Co., Detroit, Mich.
 Federal Motor Truck Co., Detroit, Mich.
 Ford Motor Co., Detroit, Mich.
 Four Wheel Drive Auto Co., Clintonville, Wis.
 Freeman Motor Co., Detroit, Mich.
 General Motors Truck Co., Pontiac, Mich.
 Gram Motors, Inc., Lima, Ohio
 Griswold Powermatic Corp., Ohio
 Hug Co., The, Highland, Ill.
 Indiana Truck Corp., Marion, Ind.
 La France-Republic Sales Corp., New York
 Larabee-Deyo Motor Truck Co., Binghamton, N. Y.
 Luedinghaus-Espenschied Wagon Co., St. Louis
 Macfar Truck Co., Scranton, Pa.
 Mack Trucks, Inc., New York
 Moreland Motor Truck Co., Los Angeles, Calif.
 Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis.
 Pierce-Arrow Motor Car Co., Buffalo, N. Y.
 Rehberger & Son, Newark, N. J.
 Relay Motors Corp., Lima, Ohio
 Reo Motor Car Co., Lansing, Mich.
 Schacht Motor Truck Co., Cincinnati, Ohio
 Selden Truck Corp., Rochester, N. Y.
 Standard Motor Truck Co., Detroit, Mich.
 Sterling Motor Truck Co., Milwaukee
 Stewart Motor Corp., Buffalo, N. Y.
 Studebaker Corp., South Bend, Ind.
 Titan Truck Service Co., Milwaukee, Wis.
 Traffic Motor Truck Co., St. Louis, Mo.
 Walter Motor Truck Co., Long Is. City, N. Y.
 White Co., The, Cleveland, Ohio

Trucks, Motor Truck

*Blaw-Knox Co., Pittsburgh, Pa.
 Canton Fdy. & Mach. Co., Canton, Ohio
 Champion Engine Co., Kenton, Ohio
 Easton Car & Const. Co., Easton, Pa.
 Freeman Mfg. Co., Racine, Wis.
 Hug Co., Highland, Ill.
 Western Structural Co., Moline, Ill.
 Whiting Corp., Harvey, Ill.

Underground Conduits (See Conduits)

Unloaders, Car

*Burch Corp., The, Crestline, Ohio
 Heitzel Steel Form & Iron Co., Warren, Ohio
 Atlas Engg. Co., Clintonville, Wis.
 Farquhar Co., Ltd., A. B., New York, Pa.
 Hais Mfg. Co., Geo., New York
 Northern Conveyor Co., Janesville, Wis.
 Webster & Weller Mfg. Co.'s, Chicago

Valves, Check

Chapman Valve Mfg. Co., Indian Orch., Mass.
 Coffin Valve Co., Boston, Mass.
 Cook, Inc., A. D., Lawrenceburg, Ind.
 Darling Valve Mfg. Co., Williamsport, Pa.
 Kennedy Valve Mfg. Co., Elmira, N. Y.
 Ladlow Valve Mfg. Co., Troy, Ohio
 Michigan Valve & Fdy. Co., Detroit, Mich.
 Rensselaer Valve Co., Troy, N. Y.

Valves, Gasoline Engine

Industrial Engine Parts Co., Inc., Cleveland

Valves, Relief

*Neptune Meter Co., New York
 Crane Co., Chicago, Ill.
 Davis Regulator Co., Chicago
 Eddy Valve Co., Waterford, N. Y.
 Golden-Anderson Valve Spec. Co., Pittsburgh
 Ladlow Valve Mfg. Co., Troy, N. Y.
 Mueller Co., Decatur, Ill.
 Ross Valve Mfg. Troy, N. Y.
 Simplex Valve & Meter Co., Philadelphia

Vibrators, Concrete

Elec. Tamper & Equip. Co., Chicago

Wagons, Dump, Horse-Drawn

*Austin-Western Ed. Machy. Co., Chicago
 Hyass & Co., Inc., Chas., New York
 Acme Road Machy. Co., Frankfort, N. Y.
 Acme Wagon Co., Emigsville, Pa.
 Adams Co., J. D., Indianapolis, Ind.
 Eagle Wagon Works, Auburn, N. Y.
 Holabog & Bro., G. H., Jeffersonville, Ind.
 Highway Trailer Co., Edgerton, Wis.
 Luedinghaus-Espenschied Wagon Co., St. Louis
 Streich & Bro. Co., A., Oshkosh, Wis.
 Stroud Rd. Machy. Co., Omaha, Neb.
 Troy Trailer & Wagon Co., Troy, Ohio
 Western Wheeled Scraper Co., Aurora, Ill.

Wagons, Dump, Tractor-Drawn

*Enclid Road Machy. Co., Cleveland, Ohio
 La-Plante-Chaste Mfg. Co., Inc., Cedar Rapids, Iowa
 *Trackson Co., Milwaukee, Wis.

Acme Road Machy. Co., Frankfort, N. Y.
 Athey Truss Wheel Co., Chicago
 Biehl Iron Works, Reading, Pa.
 Davenport Loco. & Mfg. Corp., Davenport, Iowa
 Eagle Wagon Works, Auburn, N. Y.
 Electric Wheel Co., Quincy, Ill.
 Lenhart Wagon Co., Minneapolis, Minn.
 LeTourneau, R. G., Stockton, Calif.
 Smith Trailer Corp., Syracuse, N. Y.
 Streich & Bro. Co., A., Oshkosh, Wis.
 Trail-IT Co., St. Paul, Minn.
 Troy Trailer & Wagon Co., Troy, Ohio
 Western Wheeled Scraper Co., Aurora, Ill.
 Winsor Tractor Equip. Corp., Ann Arbor, Mich.

Well Ties (See Ties)

Washers, Sand and Gravel

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 *Pioneer Gravel Equip. Mfg. Co., Minneapolis.
 Diamond Iron Works, Minneapolis, Minn.
 Good Roads Machy. Co., Kennett Square, Pa.
 Iowa Mfg. Co., Cedar Rapids, Iowa
 Jeffrey Mfg. Co., Columbus, Ohio
 Link-Belt Co., Chicago, Ill.
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 Anti-Hydro Waterproofing Co., Newark, N. J.
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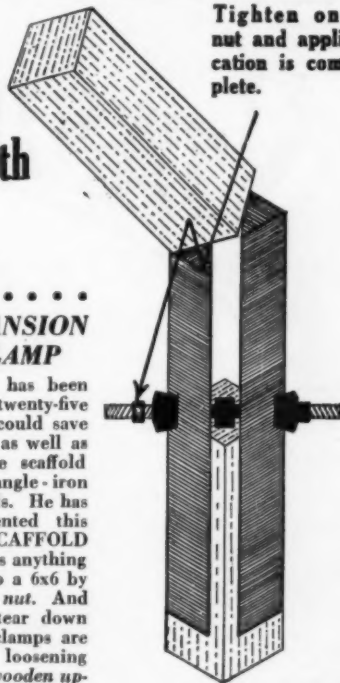
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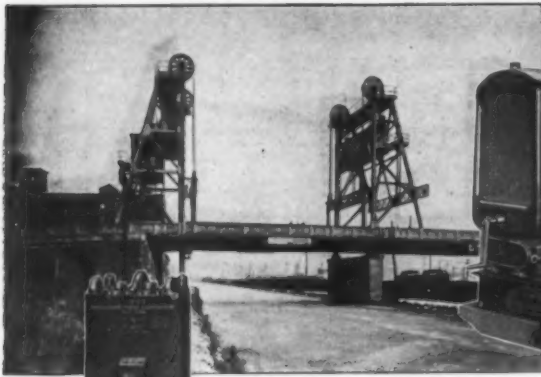
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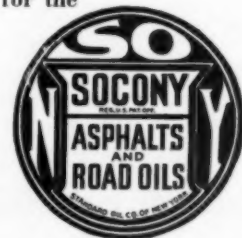
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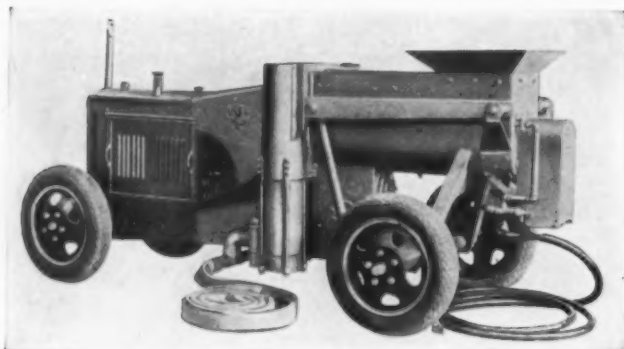


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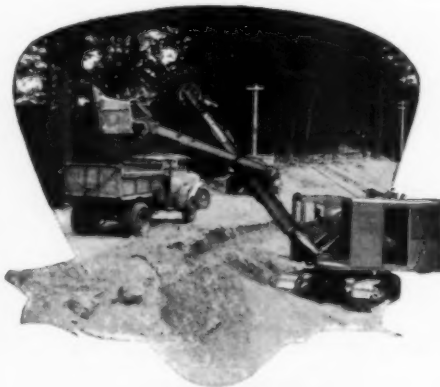
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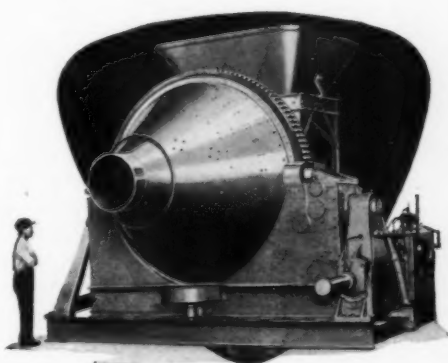


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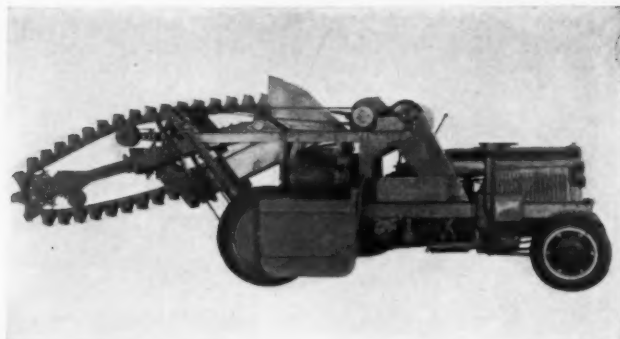
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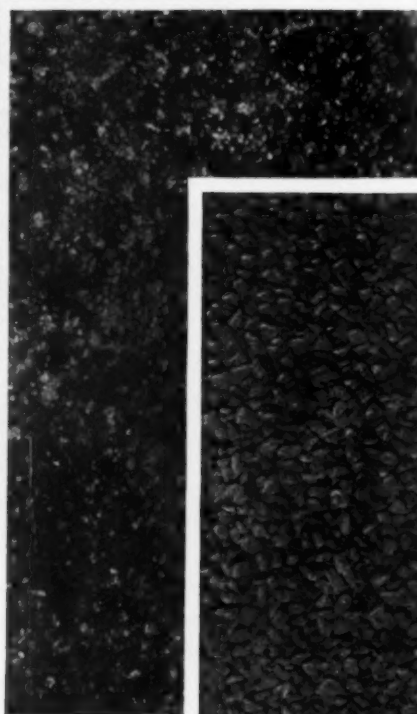
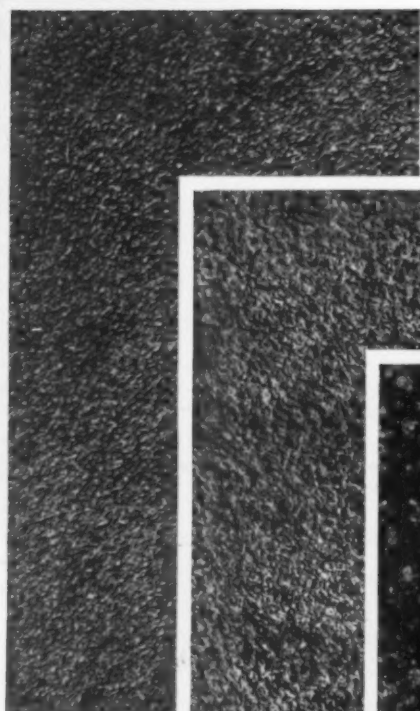
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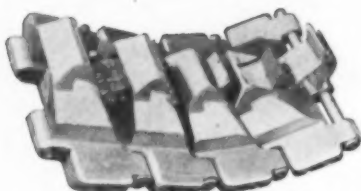
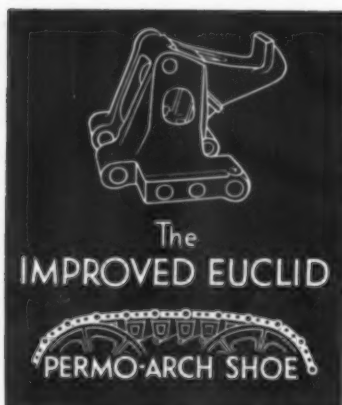
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insures a more permanent arch



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Here's the improved Euclid Permo-Arch Track Shoe. You can easily see how much cheaper it is to replace the hook alone instead of the whole shoe.

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Experience has proven that the Euclid Permo-Arch Track retains its arch and lasts longer than past or present types of crawlers. This track is an outstanding achievement—it is the easiest rolling crawler you've ever seen—you will find your tractors can handle an extra wagon without trouble—its non-clogging features will surprise you—works easier in gumbo, sand, loose gravel, or mud than other types of crawlers.

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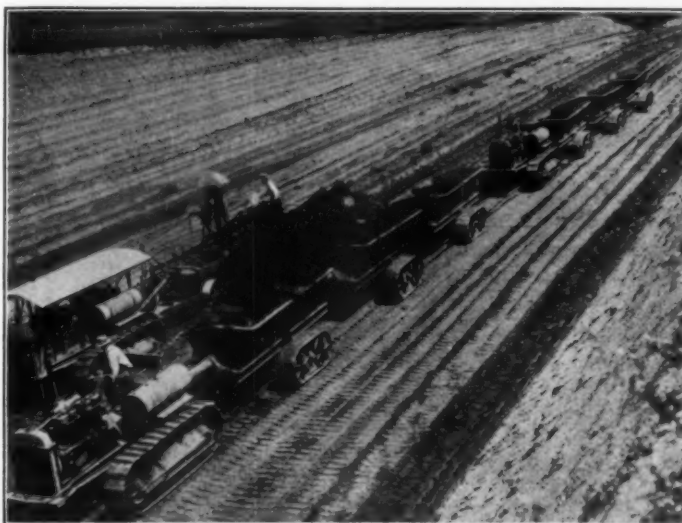
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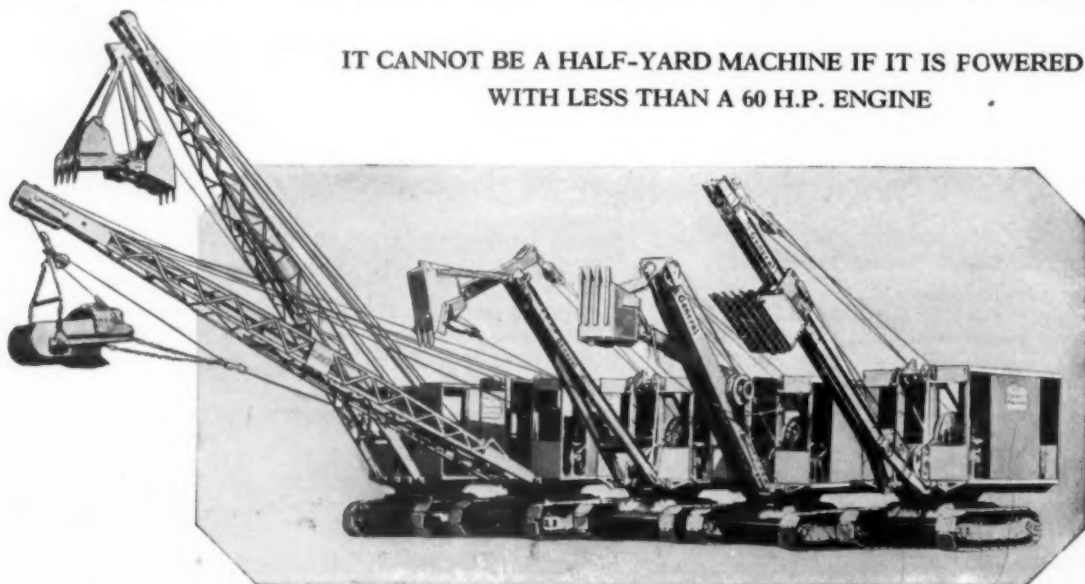
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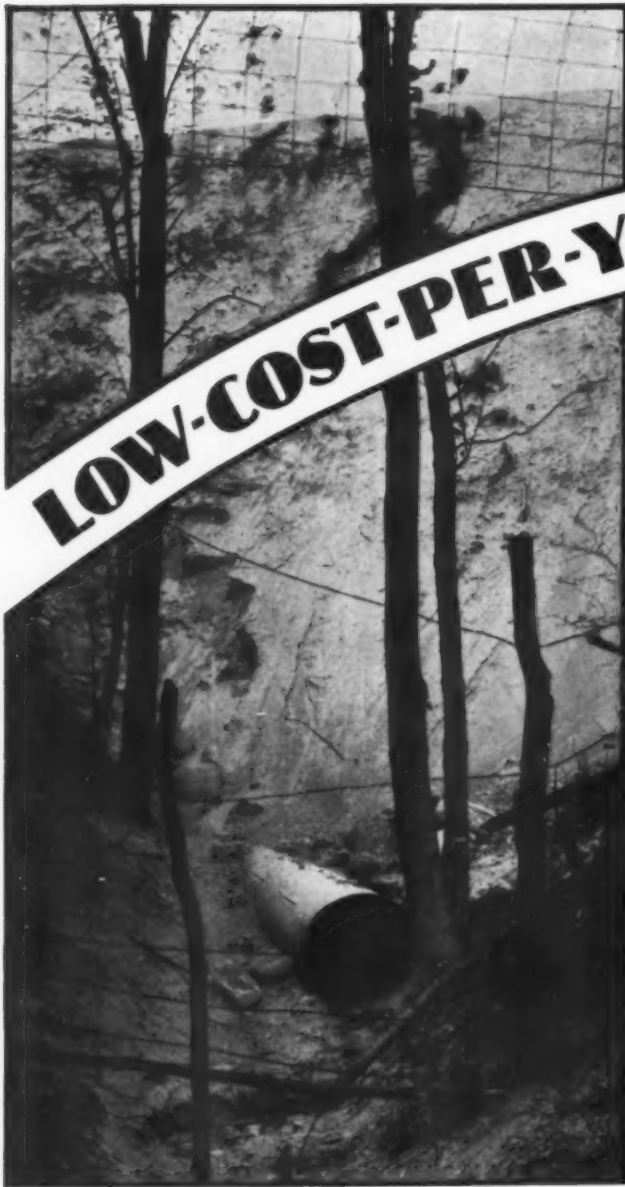
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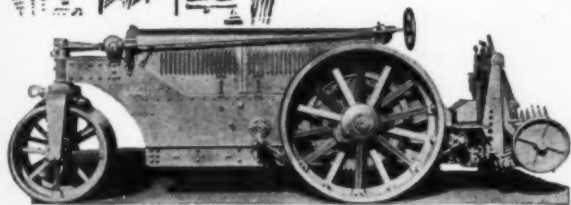
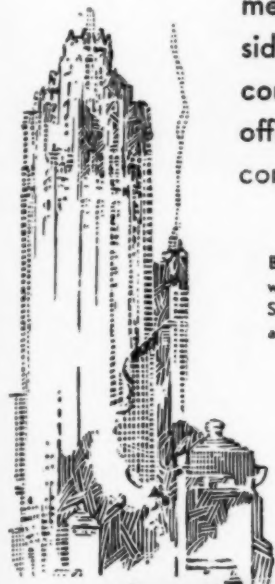
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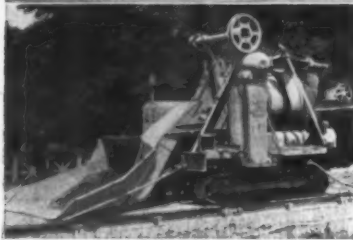
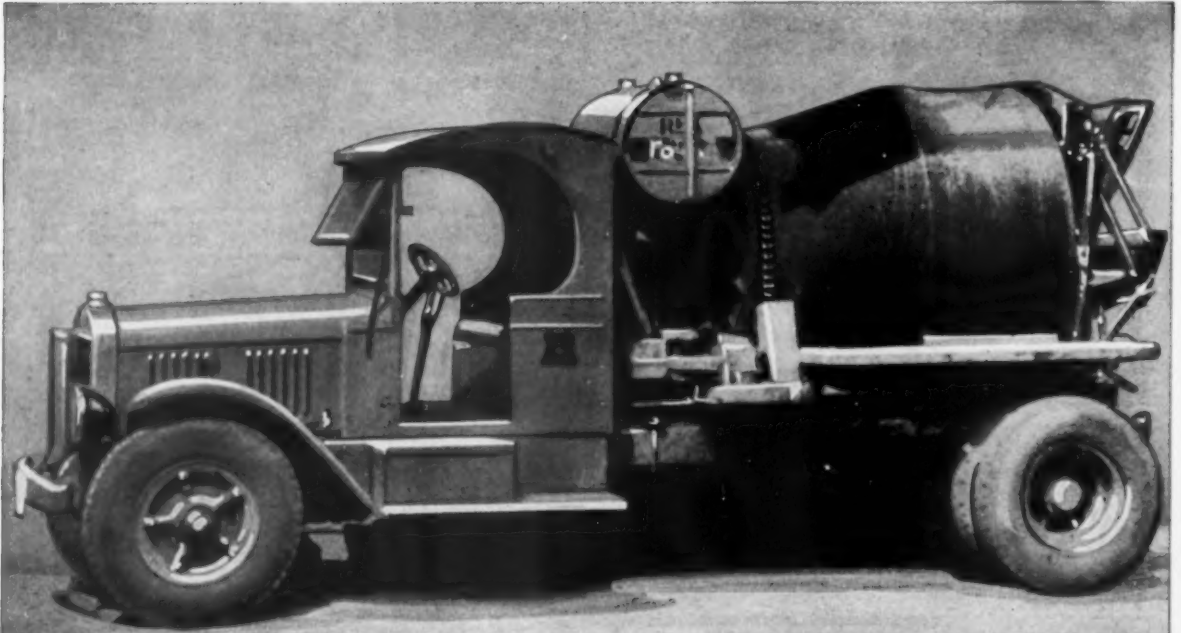
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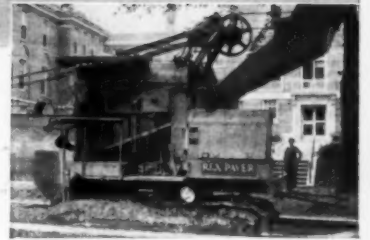
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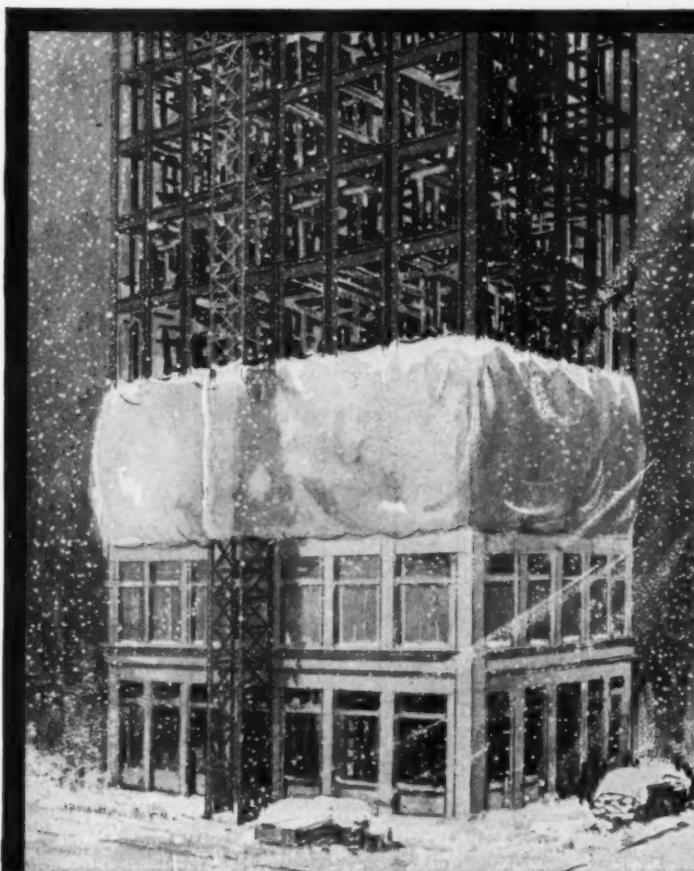
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Tandem Pavers

on an

Experimental Highway

Minnesota

Department of Highways

Varied Aggregates

and Proportions

on

Nolan Brothers Contract



The Lunch Box

DURING 1931 there were eight tandem paver jobs running in Minnesota, but it is understood that the 1932 specifications will not permit the use of tandem pavers because of the labor saving in this combination. Production of tandem pavers varies from 30 to 50 per cent more than a single paver.

One of the most interesting pieces of construction in Minnesota in the paving field this last summer was the work of Nolan Bros. of Minneapolis, Minn., in the paving of 16.5 miles of highway between Redwood Falls and a point a few miles east of Franklin, Minn., with a tandem paving outfit and with numerous changes of the aggregates and the proportions. A brief history of the terrain through which the highway runs will be of interest. The country varies in geological formation more than any highway of similar length in the state. Starting from the western end the right of way is on an upland plateau of glacial drift heavy in sand and gravel. Following this toward the east is rugged sidehill country of typical frost boil formation along the banks of the Minnesota River. The road crosses the river valley on a dike fill built of alluvial river deposits. It then climbs up through a heavy clay soil which covers deposits of sand and gravel. The

cover varies from 5 to 20 feet. The right of way then continues for several miles through fertile undulating agricultural country with clay soil interrupted in short stretches by stratified silts and small deposits of sand and gravel.

TYPES OF EXPERIMENTAL WORK

With the full cooperation of the contractor the Department varied the aggregates in kinds and propor-



Frost Boil Correction Prior to Grading

tions. The aim of the work was to determine the advantage, if any, of a graded aggregate over the normal pit product as furnished under the standard specifications of the Department of Highways. It is hoped that as the results of the use of four sizes of aggregates and gravels and limestones are studied from this work there will be found an answer to the question, "Is the expense of separation of the aggregates warranted as shown by the results in the slab?"

The mixes were varied from one rich in sand-cement mortar to one lean in mortar under various sand-cement proportions. The mixes were changed at noon or evening to avoid any delay to the contractor in making the change. During the work the water was not confined to any one water-cement ratio but a very definite endeavor was made to secure a uniformly workable mix on the road. Studies were made comparing the field yield with the theoretical yield to locate the factors which influence the variation as between the theoretical, laboratory and field yield.

The strength of field test specimens was compared with those made in the laboratory set-up in Redwood Falls, as regards both beam and cylinder specimens of the same mixes. The proportion of cement varied from 5.1 to 6.4 sacks to the cubic yard of mixed concrete. The method of running the varying proportions of cement to total aggregate was to take one definite ratio and then vary the coarse and fine aggregates within that ratio. The job was divided into three sections as regards the use of different kinds of aggregates. On the first section three grades of gravel and one sand were used; on the second, two sizes of limestone and pea gravel were used with the same sand; and on the third, three sizes of limestone aggregate and the same sand were used. The gradings as far as sizes were concerned were the same in all aggregates for coarse, medium and fine stone, no matter what kind of stone was used. In the aggregate sections mentioned above the first two were each 6.5 miles in length and the third 3.5 miles long.

In all these experiments the Department of Highways maintained as complete a check over the conditions as possible, noting temperatures of the air and concrete, testing the soil at frequent intervals for porosity, etc., all with an endeavor to interfere as little as possible with the normal operations of the contractor. The complete results of these studies will not be known for several months to come as there was accumulated a vast amount of data which will require months of study by those in closer contact with the actual conditions in the field in order that the comparisons may have the greatest practical value. Further, the results of the work will be reflected in the life of the various sections, this being a factor that cannot be reported on for a period of years but which will be watched with a great deal of interest.

THE PERIOD OF WORK ON THE EXPERIMENTAL HIGHWAY

The contractor started work on the fine grade on April 29, 1931, there being no rough grading in this contract. The test road was built over a gravel road which had been maintained for at least three years by the State maintenance crews. The original grade was 30 feet in accordance with the state specifications with the exception of the western 3.5 miles which was graded

to 40 feet in 1930. The entire project was finished to provide 8-foot shoulders adjacent to a 20-foot pavement. The entire stretch of highway was well drained, there having been but one change in drainage structures under this contract. Pouring of the concrete started on May 1 and was completed August 14, 1931. This contract was under the latest labor requirement which permitted not more than 48 hours work per week per man. This regulation was made in an endeavor to overcome the unemployment conditions throughout the state. On this job they ordinarily worked 10 hours per day for four days and 8 hours on the fifth day, closing down on Saturday.

The average run per 10-hour day with a single paver, working under the rigid Minnesota steel setting requirements, is around 1,150 feet. The average hourly production is about 112 feet, while the tandem pavers used on this job had no trouble reaching and maintaining 160 feet per hour and did run as high as 174 feet per hour for long periods. The theory of the tandem paver operation is that the production must be at least 30 per cent greater than single paver operation to make the tandem outfit profitable. The labor required is about 20 per cent greater than for the single outfit. The best day on this job averaged 69 batches per hour with the two pavers, while a single paver will turn out around 46 batches with the same mixing period of 60 seconds in the mixer.

HOW THE CONTRACTOR WORKED

This text has thus far been devoted chiefly to the experimental nature of the work and to the theory of the tandem paving outfit. The space devoted to the experimental work is felt to be warranted as the nature of the work was to determine something that will be of great help to the paving contractor, whether he works in Minnesota or elsewhere, as other states will also be guided in their specifications by the outcome of these tests. To the contractor they mean a reasonably final determination as to whether he has to handle two aggregates, three aggregates or four. And the bid prices for jobs in the future will be governed by the added amount of equipment the contractor will require to handle the extra sizes of aggregates.

A flat bed truck went ahead on the fine grade before any final grade was prepared or forms set and distributed the pipe for the water supply to the paver, the long reinforcing bars for the center and sides of the slab, and the drums of asphalt. The fine grade was prepared by a Caterpillar Thirty with a Carr scarifier, and a second Thirty with a rotary scraper. A Warco Road Hog one-man grader cut the trenches for the forms and built the grade. No subgrader was used.

There were two form setters on each side setting the 9-inch Metaforms. Six shovelers handled all the trimming of the grade that could not readily be done by the one-man grader. Two men tamped the forms and one man oiled them with a brush. For soft spots, and where there was considerable grade built up, an Austin Pup gas roller was used to compact the grade. The forms and grade were prepared for only 400 to 500 feet ahead of the paver, giving an impression of congestion close to the paver. The batch trucks threaded their way through the grading equipment but the delays attendant to the use of a subgrader were not encountered.

The superintendent felt that the proximity of the grading to the paver was an advantage and the delays were not as considerable as when a subgrader was used.

MAKING UP THE BATCHES

Several locations of the batching plant were used but

men in the stone cars, the craneman, one batcher man on the Johnson batchers, and one man with a horse and capstan to move the cars. The coarse aggregate bin was equipped with a grizzly of 3 x 5-inch mesh made up of rods. The two-batch trucks then drove to the sand batcher where the pea gravel or fine limestone and the



FROM BATCHER TO SLAB

1. Unloading and batching the two coarse aggregates. 2. The batcher on the opposite side of the track where the pea gravel or fine limestone and the sand were weighed and loaded. 3. Setting the steel for a contraction joint. 4. An unusual panorama of concreting operations furnished by J. S. McMillan, Resident Engineer. 5. A strap iron support for side bars. 6. The 2-car, 2-trap cement dock. 7. Cutting a dummy joint. Note the extension of the cutter over the forms to limit the depth of the joint.

the one to be described is typical. At Franklin, Minn., the trucks first drove to the stone batchers where the two coarser sizes of aggregate were weighed and loaded. Aggregates were received in gondola cars and unloaded direct to the bins by a Northwest crane with a 45-foot boom and an Owen 1-yard clamshell. There were two

sand were weighed and loaded. The fine aggregates were handled similarly to the coarse aggregates with a P & H 206B crane and Owen 1-yard bucket unloading the material direct from the gondolas to the bins. The contractor maintained a very small stockpile. The trucks then drove forward to the cement dock.



THE CHUTING EQUIPMENT OF THE
TANDEM PAVERS

1. A batch being delivered from No. 1 to No. 2 paver.
2. The skip of No. 2 paver being raised, throwing the chute back against No. 1 paver.
3. No. 2 skip dropping and throwing the chute into position for the delivery of the next batch.

A total of 28 cars of aggregate was unloaded each day the outfit ran the full ten hours. All aggregate was shipped in by Landers, Morrison & Christensen from Minneapolis. Lehigh bulk cement was used throughout the job.

THE CEMENT DOCK

The cement dock was built to handle two cars of cement at a time and measured 38 feet long by 10 feet wide. For each box car there was a crew of two men loading the cement buggies and one wheeling, weighing and dumping. During the extremely hot weather the cement crew ran as high as ten men on the dock to give the men in the cars a chance to rest. The dumping traps were of wood with a platform for the buggies to run out on and were counterbalanced and hinged at the dock end. A U-shaped heavy rod was fixed to the outer end of the trap to form the dumping hole and beyond that there was a lighter rod from which the canvas flap was suspended. When dumping, the wheels of the carts dropped into the opening formed by the first heavy rod and then the lip of the cart struck the platform and also the outer end of the rod to clear the cement thoroughly. The traps were raised and lowered to clear the cabs of the trucks as they drove through. A fleet of fifteen trucks owned by the E. O. Dahlquist Contracting Co., of Minneapolis, did the batch hauling by contract. The maximum haul was 4.5 miles because of the judicious selection of batching plant locations. The road ran from Redwood Falls to east of Franklin, Minn., a distance of 16.5 miles. The first plant was set up at Redwood Falls and 3 miles of pavement poured from the east toward Redwood Falls. Then the plant was moved 6 miles east to Morton and 3 miles of pavement completed, pouring east toward the plant and another 3 miles pouring west toward the plant. The plant was then moved to Franklin about 4.5 miles from the east end of the contract and 3 miles poured running east toward the plant and the 4.5 miles from the east end toward the plant.

THE TEAM OF TANDEM PAVERS

The last piece of equipment ahead of the pavers on the grade was a Freeman double-end turntable which was handled by one man about 150 feet from the skip of No. 1 paver. The paver team consisted of two regular Rex 27-E pavers properly spaced with a tie bar of steel. The boom and bucket of the first paver were removed so that the concrete from No. 1 paver would discharge directly into the skip of No. 2 paver. The skip of the second paver had a baffle at the end to prevent any of the concrete from running out the end as it was being loaded or during raising. A well-conceived device on the discharge of No. 1 paver prevented any spilling of grout or concrete when the discharge was made or immediately after. When the skip dropped to within 18 inches of the tie bar, it hit two rocker arms actuating a chute which was hinged at the bottom to the frame of the paver and causing it to drop over the skip of the second paver. When the skip was raised it pressed against the sloping face of the chute and pushed it back, at the same time reversing the slope of the chute so that there was no drip of grout or concrete from the chute. The batch trucks were dumped as rapidly as they could be brought into position by one man who also cleaned

the bodies to insure a complete discharge of every batch. There was an operator for each paver and the teamwork of these men was largely responsible for the success of the operation as there was no interlocking of the controls. All water for the batch was added in No. 1 paver but a water connection to No. 2 paver made it possible to add water if the first batches of any new series were too dry to maintain workability. The water was also readily available for washing out the paver at the end of each run.

REINFORCING

No. 2 paver pulled a Koehring subgrade planer from which two men shoveled the excess earth cut from the grade. Three steel men working steadily handled the rather complicated reinforcing of the Minnesota slab and placed the chairs under the center bars and the removable chairs at the side forms. The removable chairs used under the center steel were formed with a flat plate resting on the subgrade with a vertical U-shaped support of round rod extending upward from the center line of the plate, the proper distance to elevate the steel. A 4-foot rope was attached so that the chair could be pulled as soon as the concrete was poured around the rods sufficiently to support them. The center bars were spaced temporarily from the forms with wood bar spacers until the first concrete was poured around them. The removable side bar supports at the forms were made of strap iron with two hooks to hold the steel 6 inches from the face of the form and a specially bent section to fit over the top of the form to hold it firmly in place. The 40-foot center bars were strung out along the grade ahead of paving and were threaded through the subgrade planer into place.

FINISHING

Three puddlers handled all spreading and spading and shoveled also to the strike-off of the single screed Lakewood finisher. This finisher was used only as a strike-off and it carried the metal forms for the poured 1-inch expansion joint which was left in place. It was a special type of thin sheet metal plate bent into the form of a W with parallel sides and a small notch at the bottom. It was flanged at the top for about $\frac{3}{4}$ inch and had holes to accommodate the dowels. It was set in place by the steel setters at the proper spacing, using a board inside to prevent the form from collapsing from the pressure of the concrete. The board was later removed after the concrete had set up sufficiently. The dowels used for the expansion joints and the dummy contraction joints were carried handy to the steel men on the top of the subgrade planer pulled by the second paver.

Following the first finishing machine was a second Lakewood with two screeds which pulled a trailer along the forms carrying a hand machine with plow handles for cutting the transverse contraction joints. A plow cutter mounted at the center of the trailer also cut the longitudinal slot on the second pass of the machine for the insertion of the removable center dummy joint markers. These markers were set by a man riding on the trailer who also helped the finisher operator to cut the transverse dummy joints and to place the removable wedges or markers.

The longitudinal or Iowa float, 12 feet in length, was

run across the slab twice by two men from a double rolling bridge. These two men also used the drag straight-edge to remove excess grout and take out any holes shown up by the longitudinal float. Following these came the two joint finishers who pulled the wedges or markers from the center joint and the transverse joints. A helper for the form pullers collected the dummy joint markers and carried them forward to the trailer and cleaned them and oiled them ready for reuse. A Lakewood master steel straight-edge was carried on the float bridge and was used from two to five times a day to check and correct any warping of the wooden straight-edges. Red crayon was marked along the entire length of the master straight-edge and then the wood straight-edge was rubbed along the master. Where no crayon showed on the wood it showed that the wood had warped and the high spots were shaved down with a plane and the wood rechecked until accurate.

CURING

The two men who applied the burlap used the dry belt just before the burlap was laid and sprinkled. This was done after all the slots for the pouring of the center joint, the transverse dummy joint and the expansion joints had been opened. Two sprinklers were used, one for each 900 feet of the day's run. The stripping of forms was handled by one man and the forms were brought forward by two teams after loading by the driver and a helper. The burlap was brought forward at the same time. Two men with two tar kettles poured all the joint slots.

The earth cover for curing was subbed and was handled by about nine men. The contractor had one sprinkler back wetting down the cover for each 1,000 feet of slab for five days.

Water supply for the pavers and for sprinkling burlap and earth cover was furnished by one to three C H & E No. 11 triplex pumps at different locations and delivered to the paving operations by a 2½-inch pipe laid along the shoulders. Taps for the paver and sprinkler hose were set in at 300-foot intervals. The paver carried 200 feet of 1½-inch hose.

GASOLINE SUPPLY

Gasoline for all the equipment was furnished by the Standard Oil Co. of Indiana, a tank truck visiting each piece of equipment at noon and night to see that the tanks were full. The slips for the gasoline and oil were turned in every night to the superintendent to be checked. Stanolind paving asphalt was used for pouring all the joints on this job.

PERSONNEL

The entire paving of this 16.5-mile experimental highway was done by Nolan Brothers of Minneapolis, Minn., for whom Joe T. Daugherty was Superintendent. J. S. McMillan was Resident Engineer for the Minnesota Department of Highways with C. J. White as Resident Engineer in charge of the experimental work. Both Resident Engineers and the Superintendent for the contractor reported the complete cooperation of all parties to secure the most reliable results from the studies under way and with as little disturbance to the routine of a paving contract as possible under the conditions of operation.

Replacing a Railroad Bridge

under Traffic



*Main Line Railroad and Heavy
Motor Vehicle Traffic on
Through Highway Were
Maintained During
This Work*

THE State Roads Commission of Maryland is rapidly completing the widening of the Washington Boulevard, between Baltimore, Md., and Washington, D. C., from a 30-foot roadway to 50 feet providing for four lines of traffic. This boulevard is a part of the main coastal Route No. 1 extending from St. John, New Brunswick, to Key West, Fla.

At Elkridge, Md., 9 miles southwest of Baltimore, it was necessary to replace a 30-foot concrete arch, which carried the main line tracks of the Baltimore & Ohio Railroad over the state highway. Owing to the nature of the traffic, the work had to be done without detouring either the railroad or highway travel. The new structure consists of deck plate girder solid concrete floor construction on concrete abutments with a clear span of 50 feet. The bottom flange is curved to a radius of 167 feet to afford the artistic effect of a flat arch.

DETAILS OF CONSTRUCTION

In carrying out this project, falsework, consisting of I-beam spans supported on wood piles with wooden pony bents resting on the haunches of the arch, were installed by the Operating Department of the Baltimore & Ohio Railroad without interruption to their traffic. The old concrete arch was then stripped and the wings and parapets removed. This was accomplished by drilling a series of 1½-inch holes which were sprung with light charges of dynamite, and the concrete was broken up sufficiently to enable the material to be picked up by the gasoline shovel. Concur-

rently with this operation the excavation, including the foundation pits, was removed by the same machine. A portion of the concrete foundation of the arch was permitted to remain in place to act as a toe for the foundation of the new abutments.

As soon as the excavation was completed, the foundation concrete was then poured, after which neat forms were erected and all of the neat concrete was placed. All concrete material was mixed and placed with a paving type mixer of 1-cubic yard capacity.

Upon the completion of the abutments, the steel for both tracks was erected along the east wall of the railroad, resting on blocking placed upon the wing walls. Each track was erected independently of the other and fastened together only when pulled into place. The concrete deck was then installed complete, including waterproofing and the railing, ties, tie plates and ballast were placed so that the rails could be connected as soon as the structure was rolled laterally into place.

Owing to the density of railroad traffic, it was necessary to roll the bridge in during the early morning hours. The rails were cut and work started about 4:30 A. M.; the job was completed and the first train operated over the new structure on the eastbound track at

The Old Bridge
of the
Baltimore & Ohio R.R.
at Elkridge, Md.
Removed and Replaced
Incident to the
Widening
of the
National Highway
Between
Baltimore and Washington

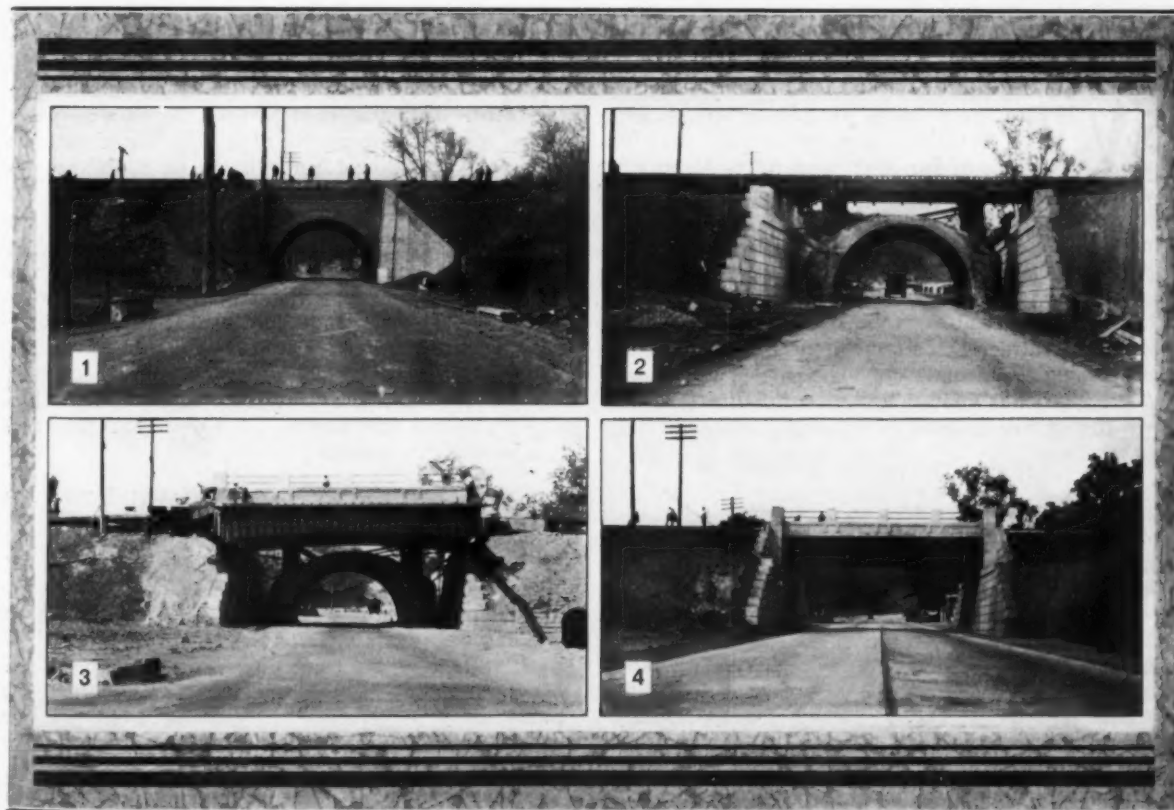
5:30 A. M. and the westbound track at 5:58 A. M.

REMOVING THE OLD ARCH

The next operation was the removal of the old arch which was done without interruption to highway travel. Due to the proximity of the new structure, no shooting was permitted and the plug and feather method was used; 1¼-inch holes spaced generally 12 inches in each direction and 3 feet deep were drilled. To prevent interruption to highway travel, a shield of metal was constructed against the intrados of the arch, carried on rails suspended from the girders of the new bridge and the entire work completed, after which the paving of the new highway was placed.

PERSONNEL

The highway work was completed under the supervision of the State Roads Commission of Maryland, H. D. Williar, Jr., Chief Engineer, and W. C. Hopkins, Bridge Engineer. The new bridge was constructed and the old arch removed under the supervision of the Baltimore & Ohio Railroad Co., H. A. Lane, Chief Engineer, P. G. Lang, Jr., Engineer of Bridges, and Richard Mather, Assistant to Chief Engineer. The contract for excavation, masonry, and the removal of the old arch was executed by the Empire Construction Co., of Baltimore, Md. The contract for the steel erection was executed by the Seaboard Construction Co., of Philadelphia, Pa.



PROGRESS OF REPLACING THE B & O RAILROAD BRIDGE UNDER TRAFFIC

1. The highway and 30-foot concrete arch, before work was started. 2. The falsework in place, abutments for the new span constructed and the wings of the old arch removed. 3. The new span ready to be rolled laterally into place. 4. The completed structure and highway.

Industrial Railway

and

Truck Mixers

Shared

Hauling Honors



Loading the Industrial Train at the Batching Plant

WITH a very complete paving organization, Julius Porath & Son, of Detroit, used two methods of handling the batches for straight paving and for intersections. For the former, industrial railway equipment was used with 10-car trains, and for the intersections quick-setting concrete was used, mixed and hauled in truck mixers which were batched at the same plant as the industrial railway batch boxes. This method was used on Michigan State Project MO63-9 Contract 1, the remaining portion of a longer job holding over from 1930. The particular section to be described was 3.156 miles in length and consisted of two 20-foot widths of 10-inch uniform thickness.

ROUGH GRADING A MINIMUM

As the project was over a very level terrain the rough grading was confined to cutting from a few inches up to about 2 feet of loose gravel with a 12-foot Caterpillar power grader. Where there was an excess of earth to be moved out a Schaefer rotary scraper with a Caterpillar 2-ton tractor was used. A crew of seven men made up the fine grade and form setting unit, which kept the 10-inch Heltzel steel forms set and the grade prepared 1,000 feet ahead of the paver. A Ted Carr Formgrader cut the trench for the forms as soon as the grade was set. The same form setting crew also pulled the forms and put on the earth cover for curing the slab. A carpenter was included in the form gang as there were a large number of catch basin castings in the line of the forms and special wood sections had to be built in where the steel forms would not fit. A Huber

10-ton gas roller was used to compact the fine grade ahead of the paver. In a few sections where the cut was in excess of 2 feet for short distances a Thew steam shovel was used with three trucks to haul the spoil to fill.

A NOVEL EXPANSION JOINT BULKHEAD

Anything from a plank placed against the expansion material to quite elaborate devices are used for setting the transverse expansion joints on road jobs. On this job a new type of bulkhead developed by the contractor was used. It consisted of two 3 x 3-inch steel angles bolted together with a piece of 3/16-inch steel plate between and extending down from the top a distance of 6 inches. This gave a T to support the joint material in the slab while pouring. To hold the Elastite slabs firmly there were three pins through the horizontal leg of one of the angles with cams in the lower section, so that when the pins were rotated they pressed the cams firmly against the Elastite and held it when the bulkhead was inverted and placed on the forms. The expansion material was in 5-foot x 10-inch sections 5 feet long, so that four were required for the width of slab. The bulkhead had a pair of pipe handles at each end to facilitate handling.

BATCHING PLANT ARRANGED FOR BATCH BOXES AND TRUCK MIXERS

The original intention was to use industrial railway equipment for the entire job including the wide intersections. Then it was decided that, because of the size and unwieldy character of a paver for this type of work and the need for speeding the pouring, as several of the intersections were in the heart of suburban towns, truck mixers would solve the problem. The Blaw-Knox bin and batchers were set up on rather low concrete pedestals for the industrial units, so that when the truck mixers were brought in it was necessary to cut out some of the concrete bases to admit the large trucks and bodies. Then to return to industrial haulage a wood crib was placed in the pit and the track replaced.

Both sand and gravel were furnished by the American

Aggregates Corp., and was hauled by trucks hired by the contractor and delivered to the stockpiles at the batcher. A Northwest crane with a 50-foot boom and a 1-yard clamshell bucket handled the aggregates to the bins. A single batch for the industrial equipment averaged 1,238 pounds of sand, 2,184 pounds of stone and 6 bags of cement. For the truck mixers the batch was 5,800 pounds of stone, 3,170 pounds of sand and 16 bags of cement, making about a $2\frac{1}{2}$ -yard batch.

The Lakewood steel batch boxes were set two to a car and handled in trains of 10 cars by Plymouth gas locomotives. There were two 8-ton locomotives, which handled the 10-car trains from the cement dock to the paver, and two 5-ton locomotives to handle the trains when they were split up into 5-car units, one 5-ton locomotive at the paver and one at the plant. One 5-ton locomotive handled half of the cars at the paver so that the finishers could work unimpeded. Another 5-ton locomotive handled the empty 10-car train at the yard to the batcher and back to the cement dock where one of the 8-ton locomotives again picked it up. Switches were installed in the main line track at 700-foot intervals. A run-around switch at the cement dock made it possible for the 8-ton locomotive to run in the empty on the switch and then to return to the main line at the dock and pull out the full train. In the meanwhile a 5-ton locomotive had picked up the empty and pulled it back to the batcher loading the train as it pulled back. Then it made the run ahead to the cement dock, leaving the train for the three men on the dock to add the 6 bags of cement to each batch box. Two men unloaded the cement bags from the truck and trailer trains which delivered it to the dock. There was also one man who shook out the bags and salvaged cement which was used about the yard. Michigan specifications forbid the use of this cement in any road or sidewalk work under state contract.

The labor organization at the batcher plant other than that already mentioned consisted of: a crane op-

erator, one hopper man, one man dumping the aggregate trucks, one man on the switch engine, one brakeman who spotted the cars at the batcher, the cement men on the dock where the number varied according to the length of the haul. When the haul was short there were four men on the dock who emptied the bags into the batch boxes, but when the haul was long the number at the dock was cut one, and only the bags were tossed onto the batches and emptied ahead of dumping at the paver by two other men. The man shaking bags used an Economy shaker.

HANDLING THE BATCHES ON THE ROAD

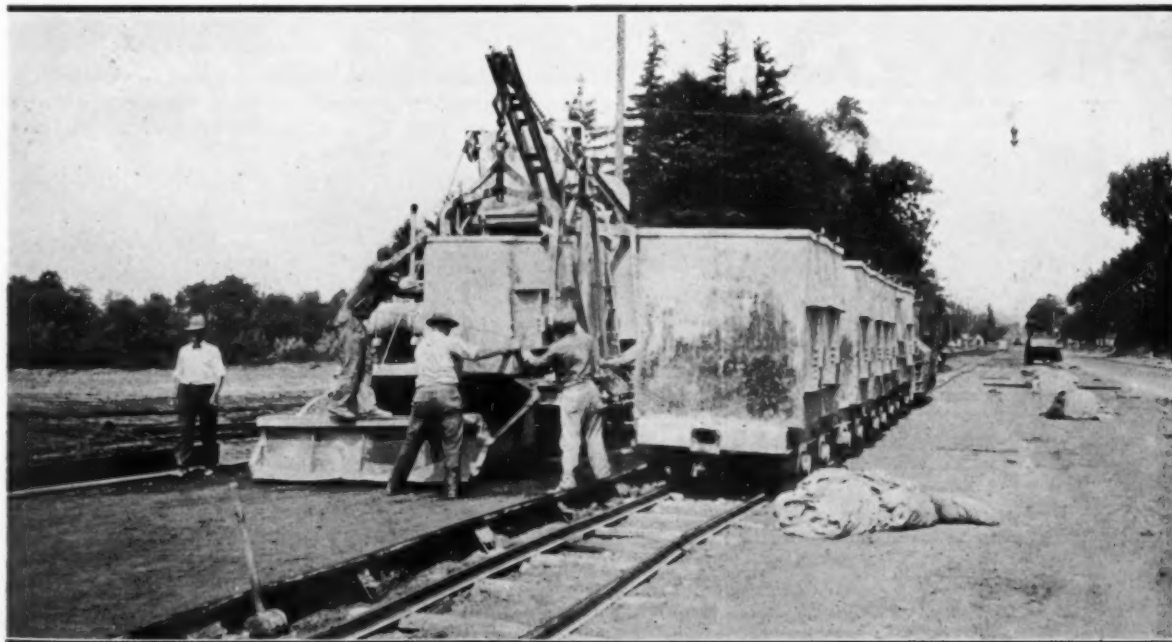
Upon arrival at the paver the trains were split into two 5-car sections, with the 8-ton locomotive on one and the 5-ton on the other, the former being beyond the paver. The train was split because 10 cars would extend from the paver skip well beyond where the men were hand finishing the slab and their long-handled floats would have hit the cars. With the usual 10-foot slab as used in the East there would not have been this disadvantage, as the entire slab could have been finished from one side, but industrial haulage is seldom used east of Michigan. There were two men handling the tongs on the batch boxes, one man on the hoist and another man to help dump the boxes, an operator and

Julius Porath & Son

Used

Truck-Mixed Concrete

on Intersections



Swinging and Dumping a Batch Box from the Industrial Train to the Skip of the Ransome Paver

an oiler for the Ransome 27-E paver, and one man called the "tail grader" who made up the expansion joints with the bulkhead, cleaned the grade behind the subgrade template pulled by the paver, moved the hose along to prevent kinks and oiled the steel forms ahead of the paver. It happened that this man, who anyone will admit could not be resting much of the time if he attended to his various duties diligently, was formerly an office man and was very enthusiastic over the outdoor work and handled it very well indeed. The transverse expansion joints were spaced 100 feet apart.

Back of the paver there were four puddlers who also placed the steel reinforcing mats $3\frac{1}{2}$ inches below the top of the slab after the concrete was struck off by the shovelers at that elevation. They also placed the $\frac{1}{2}$ -inch round dowels 4 feet long across the center of the slab just below the reinforcing mat. These were spaced 20 feet apart. Following the pouring of the top of the slab the Lakewood finishing machine was run over the section by its operator at least twice. Then there were three hand finishers, who floated the surface with large long-handled floats, and used the straight-edges to drag surplus grout from the top and finally checked the surface and edged the pavement.

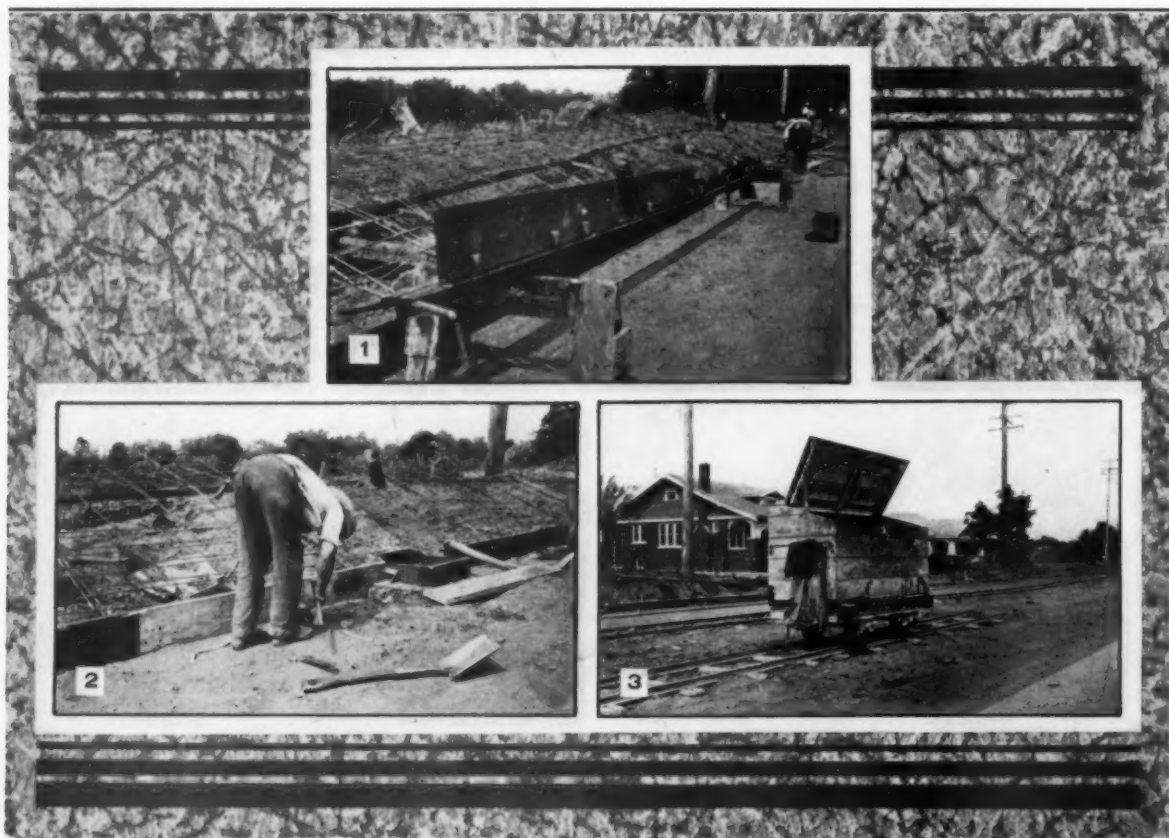
A Cleft-Plane machine was used to install the center joint of Elastite, the operator installing the joint as he progressed and hand-floating the top to a uniform surface. Behind the machine was another hand finisher

working from a movable bridge finishing the transverse expansion joints. This man with one of the finishers spread the burlap. Behind this were two men removing the burlap the following day and spreading the earth cover and two others sprinkling the earth.

With this organization the contractor was only able to make about 600 linear feet of slab a day in spite of very good progress at all places. This was due to the constant delays caused by manholes, trees, telephone and telegraph poles, lamp posts and sidewalks, and the large number of intersections which had to be poured in two parts and with fast setting cement. In fact, this job was really a city paving project as the work extended through a number of small towns and is at the edge of suburban Detroit, with its great motor traffic and large number of heavily traveled cross roads.

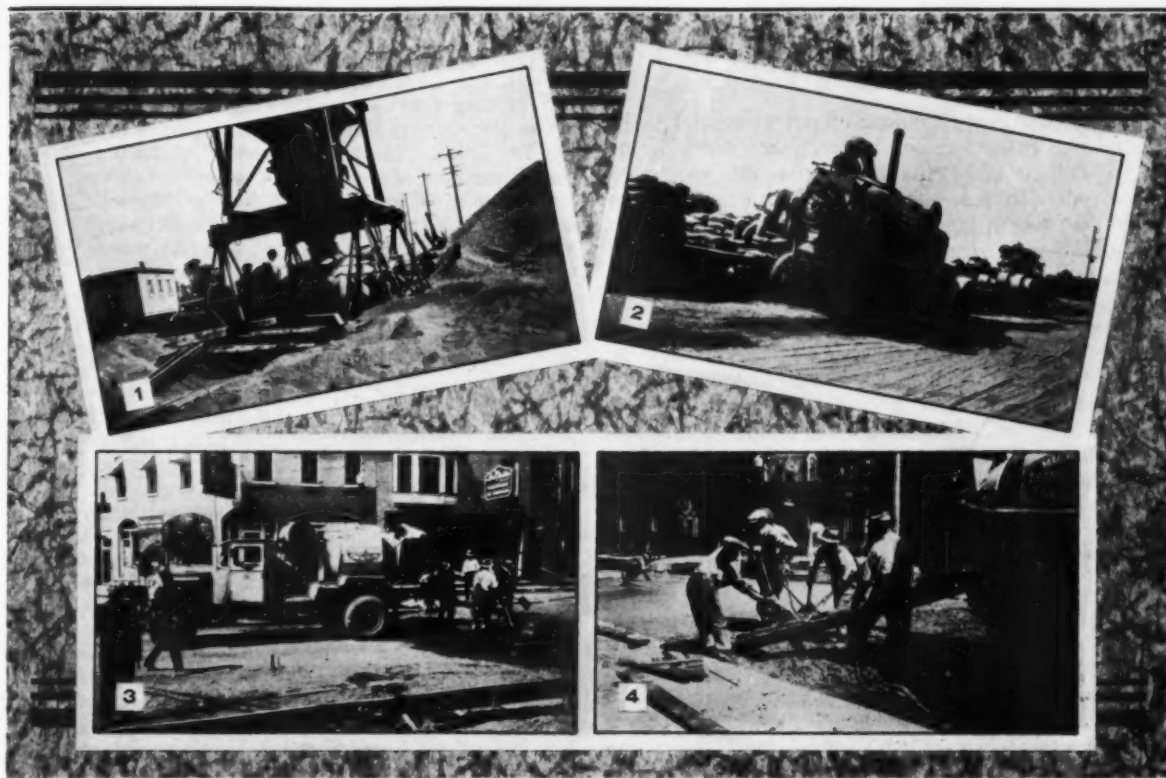
WATER SUPPLY

Water from the city mains was used for the section of the work close to the city limits of Detroit with a centrifugal booster pump operated by a Buda motor. Later the supply was taken from a creek and the same pump was set up there, pumping to a $2\frac{1}{2}$ -inch pipe line laid along the shoulder. Taps for the paver hose were set every 200 feet, but as the paver carried 400 feet of 2-inch Continental red rubber hose it used only alternate taps. The other taps were inserted for the



SOME INTERESTING DETAILS ON A PAVING JOB NEAR DETROIT

1. An expansion joint being made up on the grade in a special type of bulkhead with eccentric clamps to hold the pre-moulded material in place. The photograph shows two of the four pieces of joint in place.
2. Setting a section of wooden forms at a catch-basin casting.
3. A tool box mounted on an industrial railway car left on a siding where it would be handy for the fine grade crew.



HANDLING THE CONCRETE FOR INTERSECTIONS ON A PAVING JOB NEAR DETROIT BY THE USE OF TRUCK MIXERS

1. A Jaeger truck concrete mixer receiving its batches of aggregate after backing into a pit beneath the batching plant. When the same batching plant was used for industrial batching, the track was run across the pit on cribbing. 2. Loading the cement into the truck mixer at the cement platform. 3. Pouring an intersection. 4. Detail of pouring showing the swinging chute and the puddlers.

use of the sprinklers on the burlap and earth cover for curing.

MAINTENANCE OF MACHINES

All machines and motors were under the supervision of a capable mechanic and were inspected daily for wear, grease, oil and intelligent operation, and all operators worked under his supervision. Motor oil was changed every 60 hours, and some of the machines were thoroughly greased as often as every two hours. Break-down reports and delays were cut down to a very small fraction by this rigid method of machinery maintenance.

OPERATING THE TRUCK MIXERS

As mentioned earlier in this article the contractor used the truck mixers where the use of the large paver would have been difficult and maneuvering with any speed practically impossible. The Jaeger truck mixers used on this job were the property of Julius Porath & Son. A fleet of four was used for the 1-mile haul to the intersection poured when this job was visited. The trucks pulled into the yard and backed under the batcher plant, received the $2\frac{1}{2}$ -yard batch, ran to the cement dock for the 16 bags of cement which were emptied into the body, and then ran out into the road. Between the yard and the intersection being poured and rather close to the yard, a tap was used to fill the 100-gallon tank of the mixer. The measuring device was

set to supply 42.5 gallons to the batch when mixing started 15 minutes before the truck reached its destination. The remainder of the water was used to wash out the truck on its return trip.

When delivering the concrete to the slab at the intersection one man climbed aboard and controlled the rate of discharge by opening the circular gate at the rear of the truck body, using the large hand wheel. This type of truck mixer does not tip the body to dump, but reverses the direction of rotation of the cylindrical body. This man, by blasts on a police whistle, signalled to the truck driver to move forward, stop, or back to place the concrete properly with the swivelled discharge chute. There were four men shoveling concrete, one on the chute as the dry mix did not flow down the slight slope of the chute, and the others on the grade. The chute fitted onto the back of the truck with a short projection at the top end of the chute which was placed in an eye on the tail of the truck. Each truck normally carried its own chute, but to save time one chute was kept on the grade throughout the pouring. This distant end of the chute was supported by a cable and chain with a hook to regulate the grade of the chute while pouring and to permit it to be swung without too much effort on the part of the shovelmens.

At the intersection in the center of Farmington, Mich., three 10-foot strips were poured simultaneously, separated only by the center steel. A 30-foot belt was

used for finishing, as the finishing machine could not be used on this span.

GASOLINE FURNISHED BY CONTRACT

As is becoming very common on paving contracts, the gasoline was furnished from a small tank truck of the Sinclair Oil Co. and delivered direct to the equipment on the job. In some cases where the machines are spread out over a long job the truck is constantly in service, but where the work is more or less compact a visit in the early morning and again at noon will suffice to keep the machines running and prevent delays from "running out of gas," as has happened to the disgust of many a contractor. An instance is recalled in New England last year where there was a 1½-mile one-way traffic lane used in common by the public and the contractor's batch trucks. At about the middle of this lane one of the batch trucks ran out of gasoline and held up several hundred cars and the paver, until a 5-gallon can could be run in by the utility truck. It should not happen, but it does unless great care is taken to arrange for the regular and thorough checking of the motor fleet and equipment by some responsible person.

It is interesting to note that on this project the designed slab and the estimated requirements for cement checked remarkably with the cement actually used. For a considerable period where as high as 1,800 sacks were being used in a day the actual number was only a few sacks greater than the number called for in the design of the slab. The paver mixed the concrete for one minute.

PERSONNEL

This project was under contract by Julius Porath & Son of Detroit, for whom George Souter is General Superintendent and G. H. Cargill, Superintendent on this work. For the Michigan Department of Highways on this job, W. E. Nordberg was Project Engineer and C. L. Cowgill Resident Engineer.

A New Concrete Ore Dock

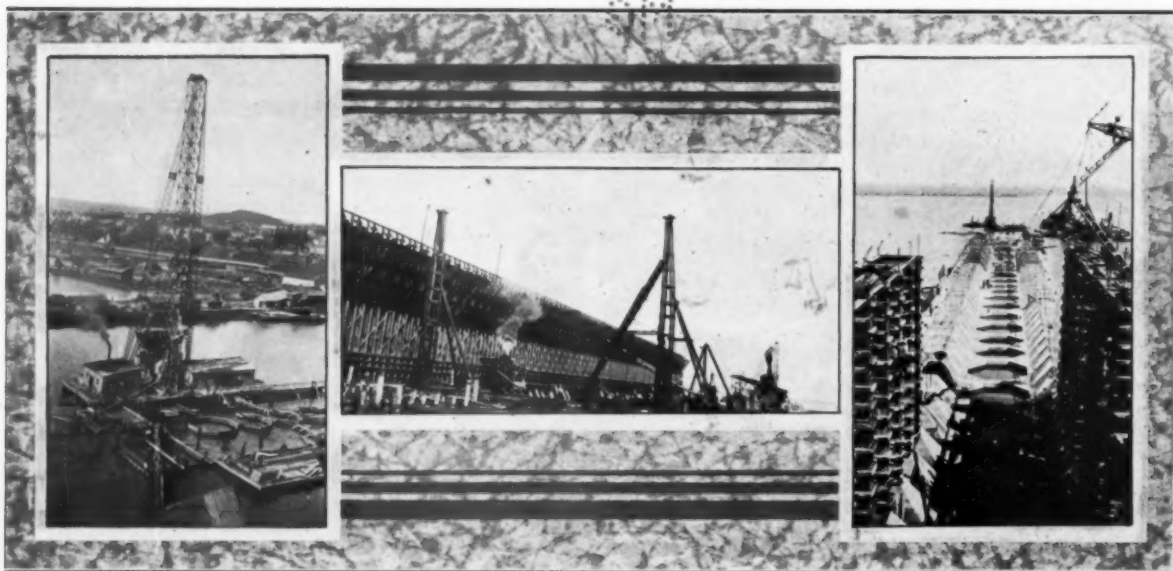
THE new ore dock being constructed at Marquette, Mich., for the South Shore Dock Co. by Merritt-Chapman & Whitney Corp., of Duluth, Minn., will be a concrete structure throughout and supported on a wooden pile foundation. There are approximately 7,500 piles supporting the dock, driven on 2-foot 6-inch centers each way for a width of 21 feet on each side of the dock with an open lane of water between, 22 feet wide. One row of batter piles is driven on each side of the dock at 5-foot centers. Cribs, measuring 24 x 60 feet, are constructed of Wakefield sheet piles at intervals of 132 feet, these being filled with sand that is dredged adjacent to the dock. The driving of the round piling was done by scow drivers while the cribs were driven by skid drivers.

The grillage or supporting floor is constructed of 2-inch lumber around the piling, about 3 inches below cut-off, and carries the concrete mattress until placed and set. Concrete struts are placed at 24-foot intervals tying the two portions of the mattress together. Concrete pedestals and columns are poured and a precast concrete strut is then placed across the tops of each pair of columns. The pocket forms are then placed by means of a gantry spanning the dock and 115 feet high on which is mounted two 10-ton stiffleg derricks.

The concrete plant is located on a scow and attended by a derrick scow to handle the aggregate. The mixer scow has a 140-foot tower which is necessary to raise the concrete to the top of the dock which is approximately 86 feet above water level. The dock proper when completed will be 968 feet long and will have 150 pockets, 75 on a side.

The approach adjacent to the dock proper is constructed of pile bents and timber for a distance of about 400 feet. From this point, the approach will be of steel and concrete.

To make the approach connection to the new dock, it will be necessary to remove the greater portion of the approach to the old dock, which will be used until the close of navigation. Gravel and sand aggregate used in the new work is handled through a series of pockets in the old dock, being brought to this point in ore cars from the gravel pit located about 30 miles from the site of the work. Cement used is received by car, and handled to the mixer by a tender scow. Structural iron and reinforcing steel are received by boat and rail, unloaded and stored in storage yards until required.



Progress of Construction on the South Shore Dock Company Project at Marquette, Mich., on May 17, 1931 (center), June 26, 1931 (left), and July 11, 1931 (right)

A Half-Million Yards of Grading

on a 12.15-Mile Project

Yost Construction Co.,

Ripley, W. Va.,

Attacked Problem

With New Methods

and

Daily Accounting

WEST VIRGINIA Route 5 is a middle route from the Virginia State line through Elkins, Weston, Spencer and Ripley to Huntington. During the past summer the State has developed this route with large grading projects between Spencer and Ripley. The larger of these extended easterly from Ripley for 12.15 miles and is reputed to be the largest highway grading project in point of yardage that has ever been awarded in the State of West Virginia. The country is typical of West Virginia, rolling with many steep grades, and the original road had many sharp turns. The contract for the grading of this section was awarded by the State Road Commission to the Yost Construction Co. of Pittsburgh, Pa., and Ripley, W. Va., for the sum of \$275,308.00. The project called for several long and deep cuts and high fills, the unclassified excavation amounting to 550,000 cubic yards and borrow to more than 3,000 cubic yards.

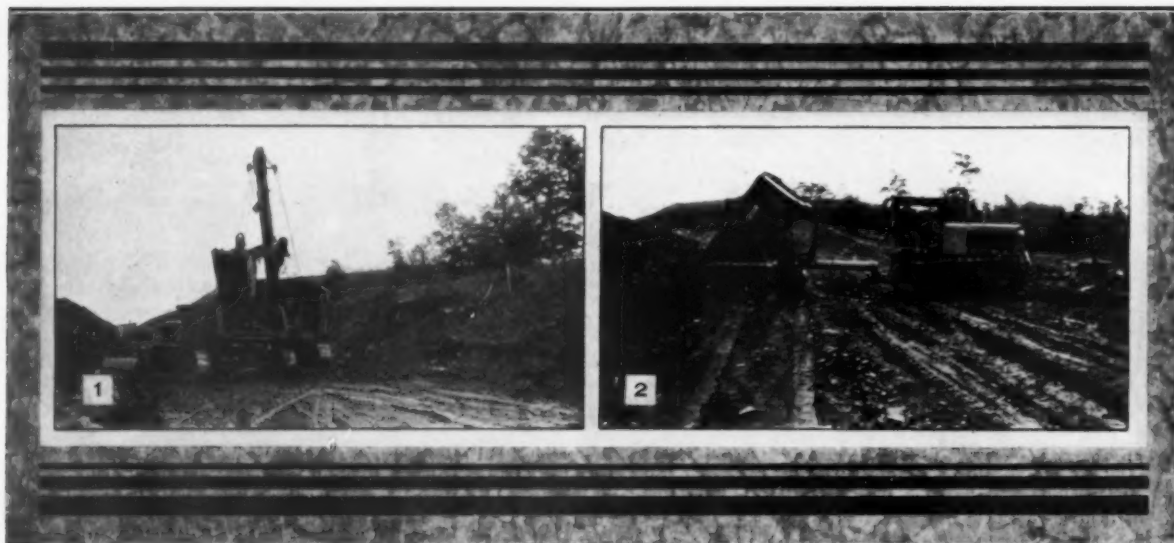
Slides, for which West Virginia is well known, carried the excavation to a figure approaching 650,000 cubic yards before the work was completed and accepted by the State. The soil of the mountain state which is a clay with some sandstone has sufficient fine material of a soapstone nature to provide a natural lubricant in the ground which permits the soil to slip whenever it is disturbed by cuts. This occurs even in dry weather but is accentuated in wet spells.



*A West Virginia Landslide on
the Ripley Job*

THE EMPLOYMENT PROBLEM

As mentioned in these pages before, West Virginia was one of the states which suffered severely from the 1930 drought. Farm labor felt unemployment even before manufacturing labor suffered and many of the counties were nearly destitute. The contractor, whose home office is Pittsburgh, Pa., brought only a skeleton organization of seven men into the State in October, 1930, and started immediately clearing the right of way with 75 men from the county through which the highway runs. Where normally a picked crew of fifteen to twenty men would be employed for the hand labor in clearing and grubbing and on the grade and carried through the entire work, the contractor, realizing that the work meant much to local labor and merchants, rotated the labor every ten days and thus employed



BALANCING A CUT AND FILL WITH GASOLINE-POWERED EQUIPMENT

1. A Northwest $1\frac{1}{4}$ -yard gas shovel loading a 6-yard Euclid gravity-dump crawler wagon in a side-hill cut.
2. Building a fill with the excavated material.

a total of around 250 men, assisting greatly in relieving the unemployment situation. Throughout the work local labor of all kinds had first chance on the work and proved very satisfactory.

THE SHOVELS COME IN

Hand labor on clearing and grubbing started October 16, 1930, and on October 25 three Northwest gas shovels were brought in and started. There were two $1\frac{1}{4}$ -yard and one 1-yard machines. Steam equipment would have been out of the question on this work as water would have had to be hauled from town and coal brought out by team in small quantities. A contract was given to a local gasoline station to supply the gasoline for all the equipment on the job. The gas was brought out by a team hauling a 200-gallon tank on a range wagon which could withstand the many jolts over the rough grade where the shovels were working.

When the shovels were started out to the job from the freight yard it was found that they were too heavy for the county bridge. This made it necessary for them to run through the creek and up a steep slope back to the grade. The first two shovels made the grade without difficulty and the third was half way up the slope when the drive chain broke and the machine started back the 100 feet it had laboriously climbed. The operator jumped and the shovel rapidly gained momentum until it was traveling at a fast pace when it hit the soft earth on the near side of the creek and stopped. As soon as the drive chain was repaired the shovel started across again and made the grade without the least difficulty. It suffered no damage from its first encounter with the clay of West Virginia.

Moving the shovels around the county bridge made it necessary to go over private property which in this case was a small turnip patch. The contractor made arrangements for the right of way necessitating the payment of \$25 for the turnips that would be damaged by the crawlers. As this sum was far in excess of the value of the turnips the men decided to use some of the

turnips, and gathered a number for home consumption. A local crowd had gathered to watch the progress of the shovels and entered into the spirit of the occasion and cleaned up the turnip patch. Many a family of Ripley and environs lived bountifully on turnips for several days.

The 1-yard shovel moved to a point 8 miles out and made two channel changes, involving the handling of about 12,000 yards. Several smaller channel changes made by this shovel added about 3,000 yards more to its score. One of the $1\frac{1}{4}$ -yard machines started at $2\frac{1}{2}$ miles out digging out old sinks or slips where it was known that the ground was treacherous. It also dug several benches, removing the earth from sidehill locations down to bed rock to eliminate the chance of new slips. Another $1\frac{1}{4}$ -yard machine went out to Hereford Church about 6 miles from Ripley and started a through cut with a big overhaul which was completed before winter set in. The machine that had been working on benches and sinks was set to work in a 52-foot rock cut about November 15. The Hereford Church shovel was brought back early in January to Mt. Olive Ridge and the 1-yard shovel brought to higher ground. Work continued throughout the winter with very few lost days but it was possible to work only four days in March and eleven in April. The ground is a red clay that is 100 per cent slippery or "slick" when saturated with water. Fortunately where drainage is provided it dries quickly and hence is workable most of the year soon after rains.

As an example of the condition of the ground in wet weather, it required two Monarch-50 tractors to pull a Euclid crawler wagon with 2 tons of dynamite during the worst ground conditions in March. Yet with reasonable ground conditions a single Monarch-50 would pull these same wagons up 20 per cent grades with the full loads of 6 yards of earth in overhaul.

DRILLING THE SANDSTONE

The unclassified excavation on this project was ap-

proximately 30 per cent sandstone which occurred usually at the top or bottom of cuts with the red clay between. This rock shot very badly in large flat pieces, necessitating considerable block-holing and secondary blasting.

Two Sullivan portable compressors of 220 and 160-cubic foot capacity and a 110-foot Gardner-Denver compressor furnished air as needed in the various cuts for the six Sullivan Rotators. The contractor has standardized on Detachable bits and an assortment of drill rods, 2, 4, 6, 8, 10, and 12 feet long. Three sizes of the detachable bits were used and except for the breaking of several drill rods after long and continuous use it has been possible to make better progress with this equipment at less expense than with drill steel sharpened on the job by blacksmiths.

In cuts as deep as 53 feet the 12-foot drill rods were used and the rock taken off in benches instead of working the full depth with blast hole drills. It is the usual practice in West Virginia to shoot the slopes in rock cuts after the full depth of the cut has been made. This contractor trimmed the slopes as the various lifts were shot and thus when the bottom of the cut was reached there was no more shooting and rock to be handled. Usually he left a small amount of earth excavation at the ends of the rock cuts to be "daylighted" and brought into the cut and bladed over to give a cushion on the

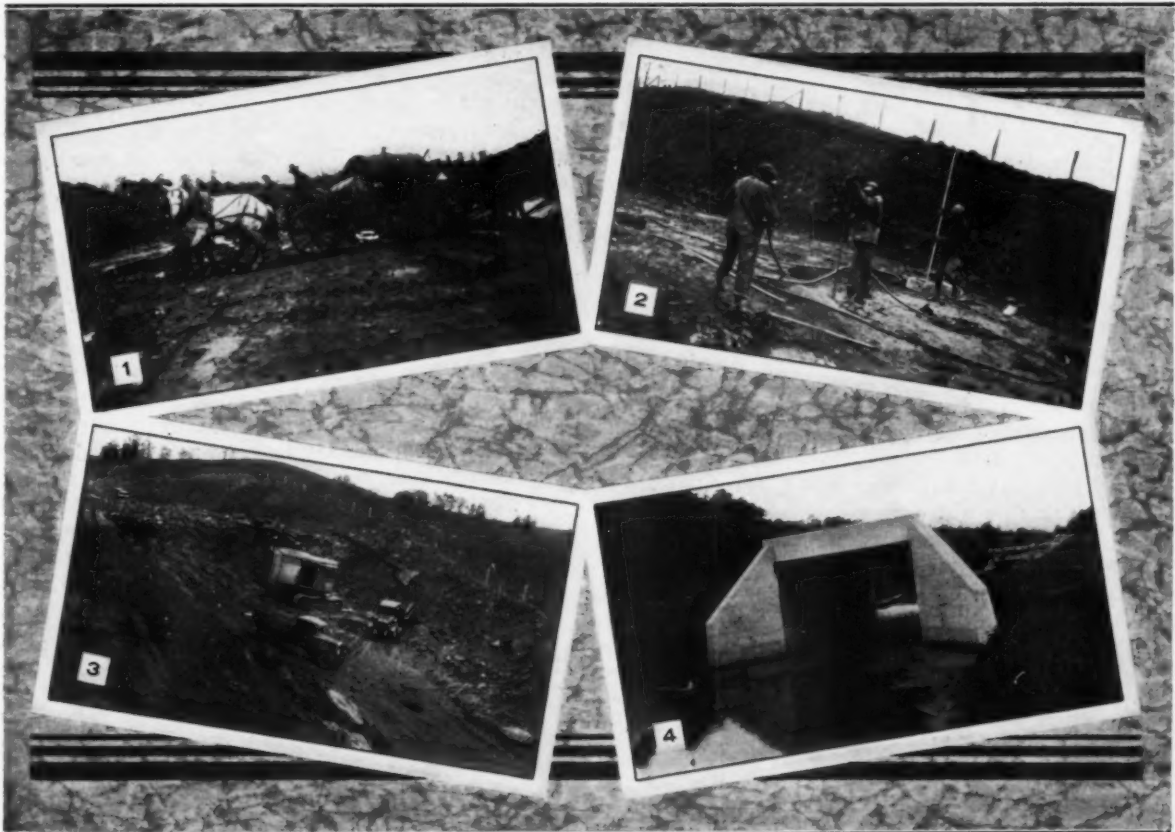
rock and a better grade for the finished road. In this work a Ryan motor-controlled grader was used, entirely eliminating the need of a shovel in cleaning up the cut.

Atlas 40 per cent gelatine dynamite was used with exploders. An average of $2\frac{1}{2}$ to 3 tons of explosive a month was used.

FOURTH SHOVEL ADDED AND NIGHT WORK STARTED

About Thanksgiving time in 1930 a fourth shovel, a $1\frac{1}{4}$ -yard Northwest, was rented from the Allegheny Equipment Co. of Pittsburgh, Pa., and was used on the ridge throughout the winter.

Starting June 1, 1931, the three shovels owned by the contractor were started on two shifts of 10 hours each. The shifts were from 7 A.M. to 5.30 P.M. and from 7.00 P.M. to 5.30 A.M., allowing a half-hour period for lunch at noon or midnight. For night work the job sections were lighted with Carbic flares on the dumps and the shovels were each equipped with Westinghouse 2,000-watt electric plants supplying current to two headlights with white enameled wash basins for reflectors, a large tail light and suitable lights within the shovel. The night crews were the same as the day crews except that the foreman at night ran the bulldozer because of the lack of local experienced bulldozer operators.



A FEW OF THE MANY INTERESTING FEATURES OF THIS GRADING JOB

1. Gasoline for shovels, trucks and tractors was brought cross country by a tank wagon.
2. Drilling a rock cut and loading the holes with Atlas dynamite.
3. A nice working layout for handling excavation. The shovel loaded to trucks on either side without interference.
4. A 10 x 16-foot box culvert before the fill was placed.

THE HAULING EQUIPMENT

The contractor used three Euclid crawler wagons with 6-yard gravity dump bodies hauled by Monarch-50 tractors which he owned and in addition a total of twenty trucks hired locally. The lack of work in other sections brought several trucks from as far away as Akron, Ohio. Of the fourteen local trucks most of them were Internationals and the remainder Sterlings and Macks, each individually owned and operated with a relief driver for the night shift.

Each truck was paid by the load and received at the end of each day a slip showing the number of loads carried. They were paid 23 cents per load and as high as 26 cents when overhaul was required. This method, which as far as known is original with this contractor, has worked out satisfactorily to all concerned. The loads were varied according to a definite schedule depending on the type of material being handled. A strict accounting system checked each day the amount of material hauled and as soon as a reasonable amount of progress had been made by any outfit on a cut the civil engineer for the contractor made a careful cross-section of the cut to determine the exact amount of material removed. This, checked with the number of loads hauled each day, and the type of material, gave him a close check on his costs. Before the work was started an independent firm of civil engineers, Upshur Engineering Co. of Buckhannon, W. Va., was employed to make a complete survey of the entire project for the contractor as a check on the quantities estimated by the State engineers. Thus the contractor had a complete picture of the entire job at any time and was not liable to be far off in his estimate of income and expenses.

For each dump there was a Monarch-50 with a Neiss Bully bulldozer to spread the fill and maintain a relatively smooth roadway for the trucks. Each dirt moving outfit consisted of one shovel with its operator and an oiler, the foreman, a dumpman, a bulldozer operator and the necessary trucks or crawler dump wagons. The fills were placed in layers and were not rolled but were amply compacted by the crawler wagons and the trucks driving over them. The hauling equipment was able to drive over all portion of the fill, thus compacting it uniformly because of the constant attention given to bulldozing.

As high as 500 loads a day were handled in some of the through cuts where it was not necessary to maintain traffic. In these cuts, as shown in the photographs, the shovel worked in the center and the trucks alternated on either side entirely eliminating the time lost waiting for a truck to load. Where traffic was maintained, the trucks could back in on one side only and the shovel worked from the far side. This cut the number of trucks loaded by the shovel to as low as 300 per day. The project was about 50 per cent relocation so that there was considerable opportunity for the maximum efficiency in the through cuts.

Because of the steep slopes at the ends of some of the cuts it was necessary for the trucks to go down a "stairway" or winding road to the bottom for the fill. As these were gradually raised the trucks took the steep grade at the top in first both ways, with a load going down and the empty truck coming up. There were

several of these winding roads on the job and the effect of the moving trucks at night and the flares at the bottom and the powerful lights of the shovel at the top made an interesting scene.

DRAINAGE STRUCTURES

All drainage structures exclusive of pipe work was sublet to the C. C. Dodd Construction Co., of Spencer, W. Va., who produced some very fine concrete work in the box culverts and the two bridges. He used a Jaeger portable mixer. Considerable difficulty was experienced at times in hauling in the aggregate and cement for the inaccessible culverts.

All pipe culverts were installed by the Yost Construction Co. At the location Sta. 105, a considerable section of a 24-inch pipe culvert was pushed out by a slip and had to be replaced and held in position by a reinforced concrete cradle about 75 feet long.

A TRIP OVER THE JOB

The best way to get an idea of what is going on throughout a job is to go over it from start to finish. We have described the various operations and the methods of the contractor in some detail. Now to complete the picture let us go over the work, starting at Ripley and continuing to Sta. 345 where a big mud hole threatened to put an end to motor transportation so we turned back lest the entire return trip be necessarily made on Shank's Mare.

The grading started at the edge of the town of Ripley where work was delayed until later so that local transportation would not be effected and the weather was better. At Sta. 62 a slide occurred making it necessary to borrow about 12,000 yards. About 4,400 yards of material was taken from the slide and placed so as to check further slipping. At Sta. 80 a long sidehill fill was first benched because of an old slide that had caused trouble for some time.

The first big cut was from Sta. 90 to 95. This was 52 feet deep and was made in five lifts. Most of the material was rock and was used for a 40-foot fill from Sta. 96 to 103. This sidehill fill required that 7,200 yards of material be taken out to make a bench to stabilize the fill. All of this dirt was wasted. The second cut from Sta. 110 to 115 was 45 feet deep and was used to make a 500-foot fill where an old slip had to be removed by benching. The fill was about 40 feet deep. Following this was a series of small cuts and fills averaging 10 feet in depth.

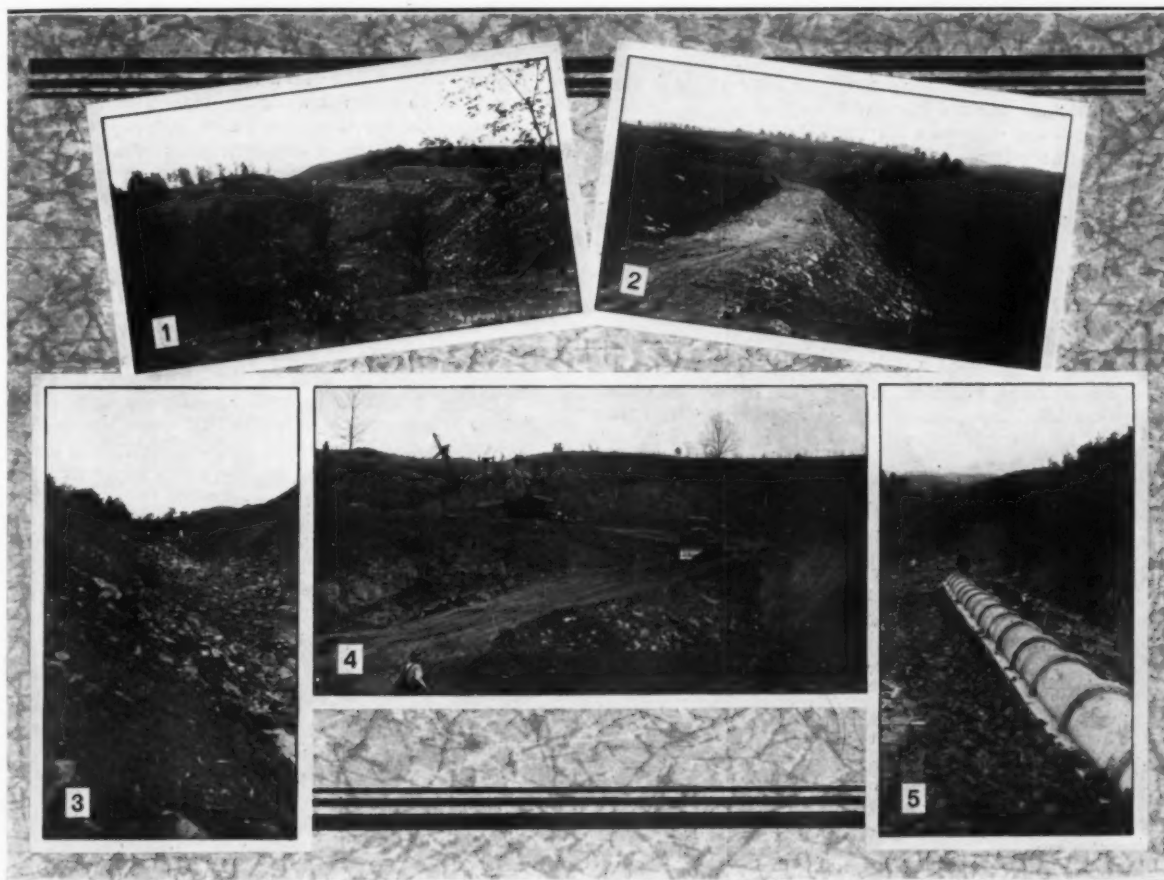
Between Sta. 133 and 138 a 40-foot fill was made from a cut of about 30 feet. Beneath this fill is a 3 x 3-foot box culvert. This was followed by a 30-foot fill, a 20-foot cut and a 20-foot fill. From Sta. 152 + 50 to 163 + 50 there is an 1,100-foot cut from 20 to 30 feet deep leading to a 50-foot fill from Sta. 163 + 50 to 168 beneath which is a 3 x 3-foot box culvert 220 feet long. To build this fill it was necessary to construct a zigzag road at either end from the cuts to enable the trucks to negotiate the grade. This made the moving of considerable extra dirt necessary outside of the grade.

Beyond this point there was a series of fair-sized cuts and fills from Sta. 168 to 226. In this section there is a 10 x 16-foot box culvert 90 feet long at the foot of

At this point—Enter: The Mud Hole; Exit: The Editor. But we can report authentically that the blue-

Un-classified excavation, excluding extras	550.00 cubic yards
Dry excavation, backwork	7.00 cubic yards
Borrow, original estimate	3.00 cubic yards
15-inch plain concrete culvert pipe	8.000 linear feet
18-inch	2.000 linear feet
24-inch	1.300 linear feet
30-inch	1.50 linear feet
Class A concrete, bridge floors, parapets and box culverts	1,100 cubic yards
Class B concrete, foundations and bridge abutments	2,000 cubic yards

This 12.15-mile grading project was executed for the State Road Commission of West Virginia, C. P. Fortney,



1. Making a heavy fill at Sta. 76. Material from an old slip is seen at the bottom of the ravine. 2. A benched fill at Sta. 96, looking east. This photograph effectively shows the topography of the country. 3. Looking west at Sta. 96 through a 53-foot cut. 4. Ladder roads like this at Carson's Farm, Sta. 115, made it possible for trucks to operate successfully down the steep slopes of ravines. 5. A reinforced concrete pipe culvert laid in a concrete cradle at Carson's Farm.

The average grade in this project was 2 per cent with a 7 per cent grade from Sta. 152 to 163 + 50 and from Sta. 172 to 180. The ruling grade of 9 per cent extended from Sta. 218 to 229.

The opening article in our February issue "New Methods—The Result of Winter's Thought," describes a number of ingenious devices and methods worked out by a superintendent to increase efficiency and speed on his job.

How the Other Fellow Did It

Construction Briefs

Setting Forms for Concrete Girders on a Grade

127. A Connecticut contractor has overcome the difficulty in setting concrete side girder forms in bridge construction where there is a grade. Inside girder forms which are ordinarily set on the curb are practically impossible to set with the panels vertical where there is a grade. To overcome this the contractor cut the forms $\frac{1}{4}$ -inch shy at the bottom and set them to line and grade with small wedges at the bottom. When the concrete was poured there was a slight leakage beneath the forms but this was removed and touched up by the hand finisher. By this simple method the contractor actually cut his cost of handling the girder forms to one-quarter of the original cost.

On these same forms at first one panel was set at a time, but a little thought given to it showed that time and money could be saved by taking the 9-foot panels and making them up for an entire span. The individual panels were laid face up on the grade, lined up and then spiked together carefully. No bolts were used to hold them together as it took too much time for the boring of the holes. After the forms were spiked they were lifted into place in a few minutes by a large gang of men. In this way the men could see just what they were doing. 21.3.56

Double Shovel Crew Increases Production of Asphalt Finishing Machine

128. Contractors are turning very generally in the south and far west to the use of mechanical finishing machines for sand-asphalt paving. Massachusetts contractors do not seem to have taken up this idea as yet, perhaps because the mileage of such jobs is not sufficient to warrant the initial expense.

On a North Carolina job where a finishing machine was used, the hot sand-asphalt was spread from the sheet metal dumping board by a crew of ten men who alternated in groups of five to be able to keep up to the pace set by the single screed finishing machine. This made for greater speed and, while no labor was saved as the additional men who would have been used for raking were used as shovelers, a far greater daily production was possible. Two common laborers were used to rake away from the screed if the roll of asphalt became too high. 21.1.74

Handling Large Diameter Concrete Pipe Without a Crane or A-Frame

129. An A-frame derrick or a crane usually shows up beside a trench in which large diameter concrete pipe is being laid. A New Jersey contractor handled 300 feet of 72-inch pipe in a manner worth remembering. He skidded the pipe down the bank, using a roller in the pipe and holding it with a block and tackle made fast to trees on the bank. To place the pipe to grade, a built-in beam with inserted rollers was placed inside the pipe with the end inside the previously laid section jacked up against the top of the pipe. The other end was then jacked up high enough to lift the new section clear of the ground and the pipe was then shoved home readily by two men using crowbars. By releasing the jack the pipe was allowed to rest on the ground and everything was ready for laying the next section. A gang of four men completed the excavation of the 300 feet of trench and laying the 72-inch concrete pipe in eleven working days. 21.3.104

A Steel Plate Expansion Joint Bulkhead

130. A New Jersey contractor, practically all of whose work is on 10-foot strip paving, has developed a steel plate bulkhead for placing expansion joints at 34-foot 4-inch intervals, the spacing required by the state specifications. The bulkhead is made up of a plate of steel cut at the bottom to the contour of the road and turned over 1 inch at the top and then down 1 inch and with a $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{8}$ -inch angle on the other side to stiffen it along the top. This bulkhead is slotted for the six dowels required across each expansion joint. The paper tubes are placed on the dowels on the side toward the paver and the supporting pair is placed on the far side from the paver. The bulkhead and expansion joint are supported by three pins on the far side from the paver and two on the near side. 21.3.69

Do You Pour Culvert Headwalls with the Paver?

131. There seems to be some difference of opinion among contractors as to whether it is more economical to pour culvert headwalls with the paver as they proceed along the job or whether it is more economical to send a small mixer back for this purpose. In states where grading is completed several months ahead of paving, the headwalls are, of course, completed long before paving starts. In the case of a Pennsylvania job the contractor poured all of the headwalls for the culverts after the concrete had been completed and was open to light traffic. A small mixer was sent back for this purpose. The contractor felt that the pouring of the slab is a wholesale proposition while the pouring of headwalls is distinctly a retail matter. If the paver were stopped to place a batch in a headwall a large organization would be held up without any decrease in overhead. The contractor would have to penalize himself on cement, as the concrete for the headwalls is not as rich as the slab. Lastly, when the road is open, it is easy to pull a small mixer along to the various sites and the aggregate can be placed on the road slab without loss. In addition the line and grade of the road slab gives the men a definite base for measurements to determine the height of the headwall. 21.5.94

Paver Crawls All Around Bridge Job and Lessens Concrete Handling

132. Pavers are built to move around on their crawlers but usually the motion is practically continuous in one direction for the length of the paving job on which the machine is employed. A Virginia contractor, in building a 5-span railroad overpass, used the paver with a high-lift skip for pouring all of the footings and the columns for the entire structure. As forms were set up on one side the paver was moved around and mixed the concrete which was dumped into an elevator skip, raised and buggied to the forms, then the paver was moved back to the other side of the bridge and the process repeated.

Excavation for the footings was carried to a depth of about 3 feet and then the forms built. The space between the footings was such that it was possible to maneuver the paver close to them with the bucket arm extending out over the forms. Thus the buckets of concrete were run out and dumped directly into the forms, eliminating all rehandling. It is well to consider a system like this where it is possible to work a paver in close to the footings. 21.3.84

Long Haul

from Gravel Pit to Paver

Sand and Gravel Plant Producing Four Sizes of Aggregates,

Bulk Cement and Batch Haulage With Two-Batch Trucks

Featured the Morris Martin Co. Job

near Sheboygan Falls, Wis.

TWENTY-MILE road jobs lead one to think of industrial haulage but the Morris Martin Co. on its 20-mile concrete paving job south and west of Sheboygan Falls, Wis., this last summer used a fleet of its own heavy trucks hauling two batches each and supplemented by a number of hired trucks. The maximum haul which was to the north end of the job amounted to about $12\frac{1}{2}$ miles. With this fleet and a large batch with a small amount of cement, the contrac-

tor averaged 1,300 feet of completed pavement per day 20 feet wide and with a 9- $6\frac{1}{2}$ - 9-inch section.

ROUGH GRADING STARTED THE LAST WEEK OF MAY

With a Western elevating grader loading to a group of Euclid 8 to 10-yard crawler wagons with sideboards to increase the load and hauled by Caterpillar Sixties, and two Northwest gas shovels, one a $1\frac{1}{4}$ -yard and the other a 1-yard machine, the contractor made short



The Complete Sand and Gravel Plant Producing Four Sizes of Aggregate, and One Crane Serving a Pair of Two-Compartment Bins

work of the moving of about 232,000 cubic yards of dirt. The 1-yard shovel loaded to three trucks and the average haul was about 600 feet. Most of the material moved was earth but there was a certain amount of loose rock that was easily handled by the shovels. The few large boulders were mud-capped and shot with du Pont 60 per cent dynamite. Trees in the new right of way were also removed by blasting as the quickest, cheapest and most thorough way.

The cuts on the south end of the job were the heaviest, running up to 15 and 20 feet. The fills ran from 15 to 25 feet, and one man was used on each dump. The material was dumped through the bottoms of the crawler wagons and leveled off by a single bulldozer and an Adams grader with a 12-foot blade pulled by a Caterpillar Sixty. For additional hand labor there was one pit man for each shovel.

FINE GRADE LOOKED LIKE FINISHED PAVEMENT

Where the rough grade was high it was scarified with a Lakewood graderooter pulled by a tractor, and then the excess dirt was removed by a Euclid Tumble Bug pulled by a Caterpillar Thirty. A Caterpillar 12-foot grader and tractor cut the grade to the full width and to approximate line as required about 800 feet ahead of the paver. The scarifier was also used to loosen the dirt at the sides of the area to be paved so that there would be sufficient loose earth to cover the pavement for curing.

As soon as the line and grade were set by the State engineers, the Ted Carr Formgrader cut the trench for the 9-inch Metaforms. Two form setters on each side set the forms a full 500 feet ahead of the paver and an Austin Pup kept the grade rolled to a firm base after it had pulled the Lakewood subgrader ahead and cut the final cross sections. The Wisconsin section is 9 inches at the edge, reducing to 6½ inches at a point 4 feet from the edge and maintaining this to the point on the far side where it thickens to 9 inches in the last 4 feet.

A crew of eight laborers on fine grade working in conjunction with the subgrader kept the grade trimmed so that it was in first rate condition the full 300 feet ahead of the paver as required by the specifications. About 200 feet ahead of the paver, and pulled ahead by the roller as required, was a Freeman turntable which does not require reversing every time it is used. This permitted the turntable man to oil the forms ahead of the paver. The trucks carried 33-cubic foot batches and yet were easily turned in quick time by the operator. The grade at the north end had considerable clay in it while at the south end it was entirely gravel.

A REMARKABLE AGGREGATE PRODUCTION PLANT AND BATCHING UNITS

The contractor's camp, the sand and gravel plant operated under subcontract by Clarence Berg, Waldo, Wis., the two batching units for aggregates and the bulk cement plant were all located at a point about 8½ miles from the south end of the job. A fine high gravel bank with a large level area below for the camp and the machinery for washing, handling and batching gave a set-



Morris Martin

up that was quite ideal. Very complete time studies were made of this plant by a group of statisticians from the United States Bureau of Public Roads. Another group also worked on the paving end of the same job.

A Pioneer sand and gravel plant handled the production of the four aggregates used on this job. There were three sizes of stone, and the sand. Bank gravel was pulled in to the receiving hopper of the plant by a power scraper supplemented by a truck which was loaded from another cut in the same bank where the fines

ran a little higher. The bank gravel was fed to the plant by a long belt conveyor and then the large material crushed and the entire production washed by a powerful stream of water from a nearby lake. Four separate belt conveyors delivered the washed material to the different stockpiles from which it was handled to the two batcher units by cranes. The Pioneer plant was equipped with a 36 x 15-inch crusher and a 42-inch cylindrical screen.

As the batch trucks entered the plant they went to the farthest batcher plant first, backed under and received the large stone, and then drove out and backed under the second batcher for the small stone and sand. The contractor used thirteen of his own trucks, all Titan and Oshkosh trucks, for hauling batches and hired a maximum of eight trucks. The two batcher plants, the first a Butler and the second a Blaw-Knox, were kept operating by a Koehring crane with a 1¼-yard Owen bucket. A sufficient space was left between the stockpiles and the batchers to operate the crane readily.

The final operation at the batching plant site was the loading of the bulk cement into the batch trucks. The cement batcher plant, a Butler unit, was located at the top of the hill just before the trucks reached the right of way of the new road. It was only a matter of a few seconds for the trucks to drive under the plant, have the cement shot through the rubber tube into the batch, move ahead and receive the second "shot" and then drive straight through to the road. As each batch of cement was placed in the truck a man climbed aboard and shoveled sand over the cement to prevent its being scattered by the roughness of the road or by the wind while en route to the paver.

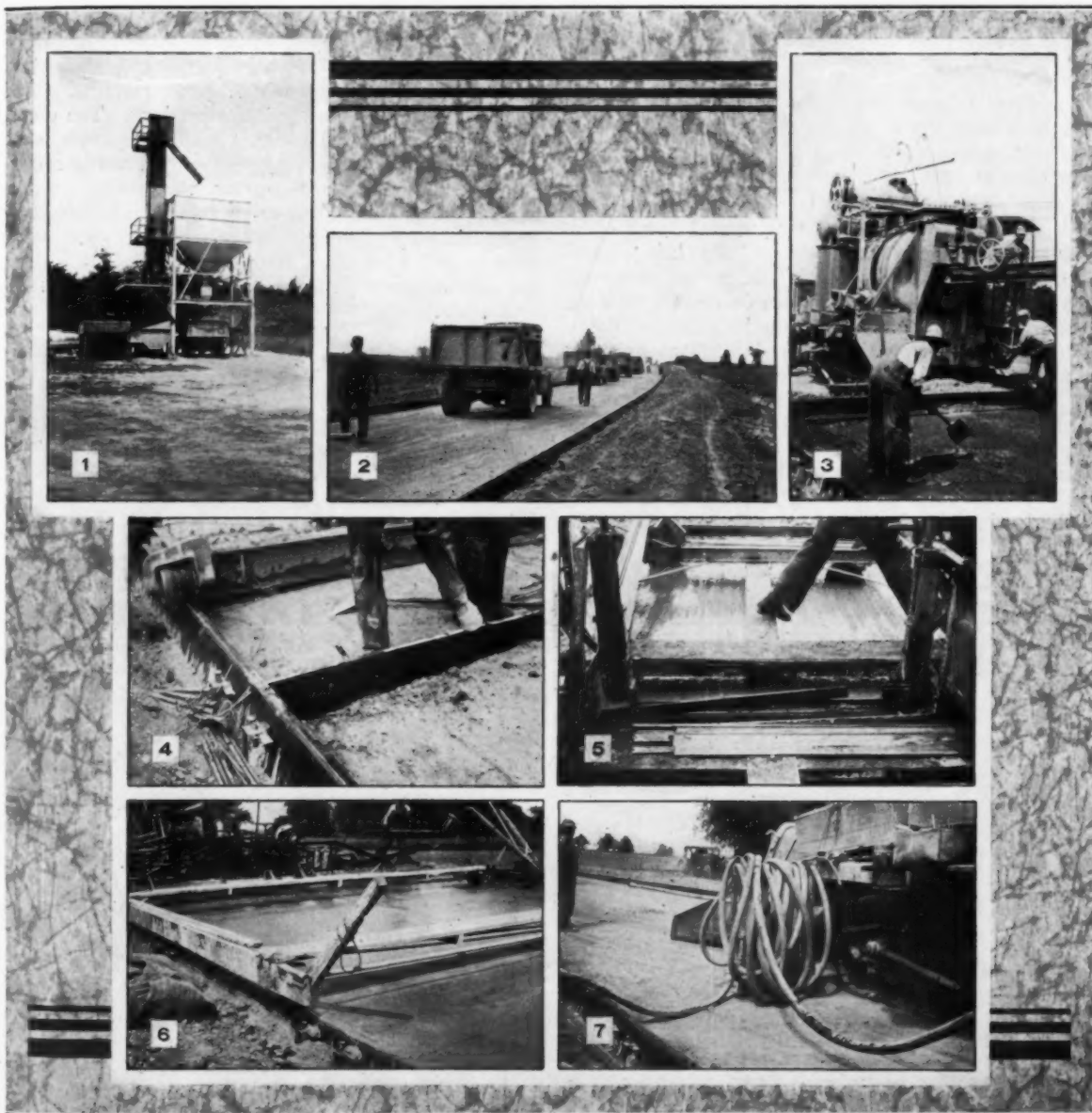
Cement for the plant was hauled in bulk a distance of 50 miles by a fleet of steel body trucks from the plant of the Manitowoc Portland Cement Co. at Manitowoc, Wis. The bodies were covered with canvas during the trip to prevent scattering of the cement. The trucks dumped into the 60-barrel hopper just above ground level by backing up a short ramp. From the hopper the cement was carried laterally by a screw conveyor to the boot of a Rex enclosed bucket elevator which raised it to the 186-barrel bin above the weighing batcher. A lever in the funnel of the bin permitted the operator to loosen the cement if it became packed. The weighing batcher was equipped with the usual beam scales and telltale showing whether the batch was above or below the required weight. A large flexible rubber tube was used to deliver the batch of cement to the trucks as that type of delivery orifice is most easily manipulated by the operator. Furthermore it bounced

readily over the cabs of the trucks with little or no wear on either the cab or the tube. Two men operated the cement plant, one on batching and the other on the delivery tube. When loading cement all that was required was to start the screw conveyor and elevator working and the whole operation was automatic, requiring no extra men. When cement was hauled at night one man was put on to watch the operation of the plant in loading the cement.

TURNING THE BATCHES INTO CONCRETE

After the trucks had made the long run to the paver and were reversed on the turntable they awaited their

turn to dump at the skip. There were nearly always two trucks waiting at the paver so that no time was lost at that expensive piece of equipment. One man dumped the batches into the skip of the Rex 27-E paver where it was mixed 50 seconds. The paver operator oiled and greased the machine himself. A Koehring 4,000-pound trail grader was pulled by the paver to cut the final grade. One man at either side shoveled to and from the trail grader as required. Two men set the steel which consisted of $\frac{1}{2}$ -inch round bars 4 feet long set across the center joint every 2 feet and similarly ten dowels across every plane of weakness at 30-foot intervals. They were held 3 inches from the bottom of the



A FEW DETAILS OF A WISCONSIN PAVING JOB

1. The Butler bulk cement plant, showing the cement truck ramp at the left. 2. Some of the fleet of 2-batch dual-pneumatic tired trucks at the paver. 3. The Rex paver. Note the pipe swung on a double A-frame on top of the paver. By pulling a cord attached to the pipe the truck dumper effectively cleaned the skip. 4. A 1-inch steel and rubber joint with slotted holes for the dowels. This was pulled after the slab was finished. 5. Setting the center strip with a hand-operated Flex-Plane machine. 6. A simple brake on the rolling bridge used by the "bull float" men. 7. The extra 125 feet of paver hose was protected in this manner.

slab by steel pins with slots to contain the dowels.

Two puddlers handled all the shoveling and spading of the concrete and kept the strike-off of the Lakewood 2-screed finishing machine piled high at all times. The first screed of the machine was set to remove the top grout as it might contain impurities of both cement and aggregates. As the sand was a little coarse the water rose quickly during the working of the concrete and this first flush of grout was quickly followed by a richer grout that finished very well. Immediately following the finishing machine there was a Flex-Plane machine which set the longitudinal plane of weakness in the center of the pavement and also the planes of weakness across the pavement at 30-foot intervals. At 90-foot intervals an expansion joint of 1-inch width was left and poured the following day. In setting this joint steel bulkheads each 10 feet long were placed across the slab and well staked. There were spaces for the ten dowels to pass through the bulkheads but each slot was lined with soft rubber which clung to the dowels and kept them clear of concrete.

Following the Flex-Plane machine were the "bull-float" men operating a 12-foot longitudinal float from a homemade rolling twin bridge. This bridge was equipped with brakes to prevent its rolling while the men were working on it. The men on the longitudinal float also used two 9-inch belts, the long handled floats and straight-edges on the green slab. Two finishers on another bridge pulled the center strip wedges set by the Flex-Plane machine operator and also edged the pavement. These same men pulled the transverse expansion joint bulkheads at the 90-foot intervals and edged them, ready for pouring the next day.

There were about twelve men in the rear handling the burlap in strips from a rolling bridge, sprinkling the

burlap, covering the slab with earth after removing the burlap the following day and sprinkling the earth cover. One of this outfit operated the Littleford oil burner heating kettle for melting the asphalt for hand pouring the longitudinal planes of weakness and the transverse planes and the expansion joints.

Another independent crew of considerable importance in the rear was the form pullers who not only removed the forms but with two men on either side and a team for each side hauled the forms forward throughout the day.

WATER SUPPLY

The water supply for the paver and for sprinkling was furnished by a No. 9 and a No. 11 C H & E pump from water courses along the right of way. A 2-inch pipe with taps every 200 feet was strung along the shoulder out of the way of the grading outfits. The paver carried two hose each 125 feet long. The extra hose was not allowed to drag along the grade and quickly become worn out but was carried neatly coiled on a pipe at the side of the paver, ready to be run out as soon as the next tap was near enough to be reached. The 1-inch steel bulkheads for the expansion joints were oiled as soon as removed from the road and placed under the operator's platform on the paver ready to be used again.

THE CAMP

The contractor had a very neat appearing camp entirely mounted on the chassis of old motor trucks. Each of the five bunk houses cared for twelve men. There was also an office wagon with two bunks for the owner and the superintendent. The mess house and kitchen capable of serving sixty men at one time was built in

(Continued on page 124)



THE METHOD OF POURING THE LONGITUDINAL AND TRANSVERSE SLOTS AND JOINTS

1. The 24-hour concrete was protected from the heat of the Littleford asphalt heater by a layer of dirt cast in from the shoulder.
2. Hand-pouring an expansion joint.



Resurfacing *with* Brick *at* 100 Feet *an* Hour

IRRREGULARITIES in the old concrete slab over a considerable stretch of pavement on U.S. Route 30, the Lincoln Highway, west of Chicago Heights, led to the letting of a resurfacing job for 6.43 miles to the State Improvement Co., of Chicago. The resurfacing was undertaken to correct the surface irregularities in the concrete slab and to strengthen it in order to handle the heavy traffic to which it is subjected. This was necessary due to the fact that the old road was showing some signs of failure, chiefly due to the fact that it was not of the present design. The original 18-foot pavement was brought up to approximate grade with a 1:3 cement-sand grout. The first construction operation was to build the concrete curbs or shoulders, which were 18 inches in width, extending 6 inches underneath and over the edge of the old pavement. The depth of the concrete under the old pavement was 6 inches and the height of the curb above the old pavement was 4 to 5 inches. Actually this dimension was figured so that the curb would be flush with the top of the brick pavement. The cement-sand grout was used only where necessary to even up variations in the old pavement surface and to provide for 1 inch of bituminous mastic and $2\frac{1}{2}$ inches of brick. The object in placing the curb was to strengthen the old concrete pavement at the edges, as well as to furnish a curb for the bricks. With this preparation the pavement was ready for the brick layers who buckled right down to business and set brick at the same rate as a one-paver concrete crew lays standard 20-foot slab.

Standard $2\frac{1}{2}$ x 4-inch vertical fiber paving brick from the Danville Brick Co., Danville, Ill., were stacked on

6.43 Miles of Old Pavement

on Lincoln Highway

West of

Chicago Heights, Illinois

Resurfaced by

State Improvement Company

the curbs in single rows seven brick high for the 17-foot surface to be paved. These were hauled out well ahead of setting from the easterly end of the job which progressed from the west end at a steady pace toward the east.

A bituminous mastic was spread over the old slab for a depth of about one inch and then struck off with two 2 x 12-inch timbers with strap iron runners and sliding on angle irons $\frac{1}{8}$ -inch thick to give the proper added depth to take care of compression under the roller. After the first strike-off was used the mastic was rolled with the hand roller weighing 240 pounds and measuring 2 feet wide by 3 feet diameter. Three men spread the mastic, pulled the strike-off and then rolled, following up with the second strike-off to check the depth

and to remove any roller marks so that the mastic cushion would be absolutely smooth and firm for the setters. The mastic was mixed in a concrete mixer about 1½ miles from the work using dry sand and about 5½ per cent Tarmac.

SETTING 100 FEET AN HOUR

Six carriers with brick tongs delivered the brick to the two setters from the continuous stack along the curb. The foreman spent most of his time removing straw from the rows as the carriers removed the brick so that it would not get into the road. Sufficient did get onto the road so that a man was used back of the setters and ahead of the filler crew to broom the pavement clean. A bat man filled in the ends of the rows left by the setters using the culls from the pavement where the inspector had "crossed" out the broken brick which were cracked by the rolling.

Immediately behind the setters and the brooming of the brick they were rolled with an Austin 3-ton tandem roller running straight forward and back. After the inspector had marked the brick for turning or removal a man with tongs turned the chipped brick and discarded the broken ones. After rolling to a firm set the bricks were filled with Tarvia by the Seneca Petroleum Co., of Chicago, under a subcontract. The bituminous material was brought onto the job in a tank truck and

applied by hose from an Etnyre pressure distributor. Three men squeegeed the material, which was at a temperature of 350 degrees Fahrenheit, into the joints to fill them completely. A considerable amount of the bituminous material was left on the surface of the brick and was covered with sand which was hand cast by one man farther back. He carefully squeegeed the sand over the pavement after casting it so that there would be no sand bumps which would cause trouble in the second rolling.

PERSONNEL

The organization of the two contractors described laid and filled 100 feet of road per hour working eight hours a day. There were 68 brick per linear foot of road. The brick setting was done by the State Improvement Co., of Chicago, Ill., H. Munch, Superintendent, and A. E. Watkins, Foreman in charge of the brick crew. B. L. Chaney was Resident Engineer for the Illinois Division of Highways.

A. G. C. Meeting This Month in Milwaukee

THE 13th Annual Convention of the Associated General Contractors of America will be held in Milwaukee, Wis., at the Schroeder Hotel between January 18 and 21, at which time the standing and special committees will make their reports.



LAYING A BRICK SURFACE ON A MASTIC CUSHION

1. Striking off the mastic cushion preparatory to compacting it with a hand roller. 2. The bricks were stacked along the shoulder and delivered to the two setters by six carriers using brick tongs. 3. Immediately behind the setters a bat man filled in the ends of the rows. 4. Turning chipped brick with long handled tongs. 5. Applying the Tarvia from an Etnyre pressure distributor and squeegeeing it into the joints. 6. Squeegeeing sand over the pavement to cover the bituminous material left on the surface, prior to the final rolling.

Winter Concreting—

Methods and Details

The Second of a Series of Articles

Dealing with the Practical Side

of Cold Weather Concrete

Construction



IN order to approach the practice of winter concreting intelligently and not by a mere rule of thumb a contractor must know the theory of the setting of cement and the effect of different temperatures on this chemical action. The setting of portland cement is a chemical reaction bet-

the cement and the water and is not a drying out process. As is the case with most chemical reactions, the reaction between cement and water is slower at low temperatures and faster at high temperatures. When the temperature falls below 32 degrees the water in the concrete which has not already combined with the cement forms ice crystals and the hardening of the concrete is practically at a standstill. Even at temperatures between freezing and 50 degrees F. the process is relatively slow. Most concrete specifications, therefore, require that the concrete shall have a temperature above 50 degrees F. when placed and shall be kept at a temperature of 50 degrees F. for at least three days. Higher temperatures than this are desirable as a larger proportion of the potential strength will be developed by the concrete in this time. With higher temperatures, however, drying out is more rapid so that it is essential to prevent evaporation from the concrete or to supply moisture to replace that which may be lost by evaporation. This precaution is too often neglected in winter concrete work.

The entire subject of cold weather concreting is embodied in the two words *heat* and *moisture*. Heat that is without moisture, which necessarily causes rapid drying out, does not produce proper curing conditions. Contractors should be careful not to mistake rapid drying out for the completion of the hardening or setting process. If the concrete is not kept moist during the early hardening, the final strength will be less than maximum. It is especially important that moisture be supplied

along with heat, because of the relatively low moisture content of winter air.

If none of the mixing water evaporated or escaped after the concrete is placed there would be more than enough present for complete hardening. The object of supplying moisture to the surface of fresh concrete is to prevent evaporation of the contained water to a quantity insufficient for the hardening process. Warm saturated air around the fresh concrete satisfies the conditions of curing.

INITIAL HEATING—

SOMETIMES HEATING THE MIXING WATER IS ALL THAT IS NECESSARY

In order to provide the proper setting temperature for concrete during cold weather, it is necessary to heat some of the materials. Heating the mixing water is the easiest thing to do and for the greater part of the winter season, heating the mixing water alone and then protecting the concrete after placing, is sufficient. The amount of heat required to raise a given quantity of water one degree F. is more than four times the amount of heat required to raise the temperature of the same weight of the usual aggregate one degree. In other words, a given weight of water holds more than four times as many heat units as the same weight of aggregate at the same temperature. As an example, if 600 pounds of aggregate are used with one sack of cement and 6 gallons of water at a temperature of 160 degrees F. while the other aggregates had a temperature of 35 degrees F., the batch temperature would be above 60 degrees F. assuming no loss of heat. Even with the usual losses the batch temperature would be well above that specified.

As mentioned in our earlier article, mixing water may be heated in various ways. An auxiliary tank or barrel is required, live steam may be ejected into the water or the water may pass through a coil in a salamander having a hot fire. Oil burning water heaters are also available. Oil burning heaters may also be attached to the mixer for heating the batch during the time of mixing. The mixer should be placed where strong winds will not blow directly into the drum. A protective wall built on the north side of the mixer will often shut off strong winds and prevent the rapid loss of heat. If the discharge end of the concrete mixer is covered with canvas, it will also protect the contents from the chilling

effect of the wind and thus maintain a higher temperature.

THE HEATING OF AGGREGATES

When the air temperature is below freezing it is necessary to heat the aggregates as well as the water. It requires a large number of heat units to melt any ice which may be in the aggregate and the materials are not in the mixer long enough to permit thorough thawing and assure a uniform distribution of the aggregates that have been frozen together. The heating of aggregates may be accomplished in various ways. Where steam is available steam jets may be placed in the stockpiles which should be covered with tarpaulin to prevent the escape of much of the steam and to assist in retaining the heat. Many contractors have successfully used a grill of pipe placed on the ground and connected to a steam boiler. The aggregates are placed on the grill and covered with tarpaulin. Where overhead batchers are used steam coils are placed in the bins and are often sufficient to heat the aggregate and to melt any small quantities of ice which may be carried into the bins by the crane and bucket, providing the aggregates have been reasonably protected from snow, thawing, rains and subsequent freezing weather. On small jobs the aggregates are often heated by piling them over a large pipe in which a fire is built.

HANDLING SHIPMENTS OF AGGREGATE

Many sand and gravel producers load gondola and hopper-bottom cars with sand and gravel direct from the washer; therefore, the aggregate will contain a considerable quantity of moisture. If freezing temperature occurs within a few hours after the shipment has left the plant and continues until the car reaches its destination, it will arrive with its contents one solid mass which is very difficult to thaw out. Steam jets worked into cars have proved more effective than any other means. Some railroads now refuse to accept shipments of wet sand or gravel if the local weather bureau reports the probability of freezing temperature within 48 hours. This is a reasonable precaution on the part of the railroads and in addition is also a protection to the contractor as it may save him demurrage. Some sand and

gravel producers are now overcoming the embargo on wet aggregates in cold weather by stockpiling the washed sand and wet gravel under cover so that it may drain sufficiently to permit rehandling for freight shipment in open top cars during the winter without danger of freezing.

ALLOWABLE MAXIMUM TEMPERATURES FOR CONCRETE

Many specifications do not permit the maximum temperature of fresh concrete to exceed 120 degrees F., while some permit temperatures up to 140 degrees F. Tests recently made and reported by the Minnesota Department of Highways indicate that these high temperatures have appreciably reduced the strength. Tests made in 28 days, of concrete placed at 100 degrees F. had about 16 per cent lower compressive strength than similar concrete placed at 70 degrees F., while at 130 degrees F. the reduction was about 33 per cent. Similar results were obtained in transverse tests. In these tests the mix was 1:2.07:3.12 by weight with a $4\frac{1}{2}$ -inch slump. The curing temperature was 70 degrees F. Part of the loss of strength is accounted for by the requirements for additional water in the warmer batches to maintain consistency. When no water was added the loss in strength for concrete placed at 130 degrees F. was approximately 20 per cent. While this series of tests was rather limited, it indicates that concrete should not be placed too hot. In outdoor work the loss of heat before the cement sets would probably be greater than in the laboratory test, but the test would indicate that temperatures above 100 degrees F. should not be permitted.

Large masses of fresh concrete are obviously better able to withstand low temperatures than thin slabs or beams. Thus for bridge abutments and piers it is often sufficient to place the concrete at a temperature of 60 to 70 degrees F. and cover the work to reduce heat loss. If the hardening process attains a normal rate, when the work is covered, the heat generated by the chemical action will be sufficient to hold up the temperature for several days. In buildings where relatively thin members only are used, the heat generated by the hardening process should never be depended upon as sufficient.

(To be continued in the February issue)



Part of a Fleet of Sterling Trucks Used by P. T. McDermott Co., Washington, D. C., on a 2-Mile Grading Job Through Hills of Yellow Clay in Virginia

Handling Hot Mix

with Spreader Boxes

The Methods

of the

Godson Contracting Co.,

One of the

Oldest Paving Companies

in Ontario



Placing the Mixed Macadam

BUILDING a road of concrete or asphalt in Ontario means building a temporary city, as even near the larger cities there seems to be no desire on the part of urban or farmer population to board road building crews. Thus throughout the Province there has come into being a dozen or two temporary cities complete with living or sleeping quarters, dining rooms, offices and running water. The mixed-macadam contract of the Godson Contracting Co., at Guelph, Ontario, during this last summer had a well-planned camp that was readily portable with the minimum effort and had all the comforts that could be reasonably expected in such temporary quarters.

First there was an office, the brain center of the job. Here was a telephone, the complete accounting equipment of the job and on the other side of the partition were the sleeping quarters of the superintendent and the other principals on the work. There were also three bunk houses, each as neat and clean as could be found anywhere. With workmen engaged in really arduous work with plenty of dirt and dust one might well expect to find plenty of dust and dirt around

the sleeping quarters where the men changed from their working clothes. Not so on this job, for each cot, with its two heavy blankets, pillow and pillow case was clean. One man was hired to make the beds and to wash the floors of the bunk houses, which were all equipped with single cots, so that each day they presented a clean wholesome appearance.

Each bunk house, which housed twenty-four men, measured 48 x 16 feet in plan and was built up of 4-foot sections. This is unusual in portable camps as most are built with 6-foot sections. The superintendent uses the 4-foot sections as they are more easily handled by one man in setting up and breaking camp, they pack better for transportation and the substitution of one section for another is easier when a door or window is to be put in place of a wall section. A year ago the kitchen was put at one end of the dining room but this year, to shorten the walk of the cook and his helpers in serving the men, the kitchen was put in the middle of the side. This worked out much better in many ways. Another interesting difference in this camp was that the floors were built in sections 4 feet wide by 16 feet long, thus one section would run the entire width of the room. This made for stability as the joists were not broken in the center of the rooms.

As much care in the handling of refuse from the kitchen was shown as in a modern restaurant. All garbage and tin cans were removed each day so there was little to attract flies and there were but few in sight. A separate room was built for the cook right at the center of his activities with the storeroom at one

side, the refrigerator on the other and the kitchen in front. A separate table was set for the principals, and any visitors, in the kitchen as there was always too much interest shown in the conversations of outsiders which were not the concern of the labor organization. Another little arrangement that led to harmony in the outfit was that each crew was housed separately; the asphalt crew both ate and slept together and the same with the road crew. Thus undue boasting or the placing of blame upon one or the other organization was not a part of the meal-time festivity. It was found that some of the men in one crew did not even know the men in the other outfit.

The roofs of the buildings were made up of ready roofing for permanent structures put on in the usual way when the houses were first assembled and then cut at the 6-foot section lines when they were taken down the first time. In these places 1-foot strips of roofing were placed over the cuts the next time the buildings were assembled. Each section of the houses was bolted to the adjacent sections. There was a maximum of eighty-five men in camp at any one time during this job and the dining room held a total of eighty. Instead of running the entire road crew in to the plant each day for lunch the cook made up large market baskets of hot food and one truck rushed it out for the half-hour lunch period. The organization consisted of the superintendent, two men in the office, fourteen men on the asphalt plant, sixteen men on grade, twelve men placing asphalt and four on screeds, or forms, and twenty men on shoulders, known as the "bull gang." The cook and his helpers also handled the laundry for the men. The privy-type toilets, one for each gang or bunk house, were cleaned once a month and moved, the old site being completely filled in and plenty of Gillet lye used. They were located far enough from the bunk houses and dining room so that no odors could possibly reach those quarters.

CRUSHED STONE PRODUCED BY REFORMATORY LABOR

At Guelph, Ontario, the western end of this paving project, is a remarkable reformatory. The inmates work all over the vast grounds with keepers in attendance but who are without guns. There are few escapes. The inmates work at various occupations of useful character such as furniture making, canning and so forth. The entire grounds of the institution are most beautifully landscaped, the work of the men themselves. One of the major activities of the institution is the quarry which has produced all the stone required for local concrete construction and which was called upon to furnish the stone for this paving project. The contractor had nothing to do with the production of stone. When it was stockpiled, he then loaded such stone as was required for his plant. Thus the prison and free labor were not used together nor was the contractor required to employ prison labor as in some of the States in the past. The reformatory ran a day and a night shift to take care of the requirements of the job, using all hand work except in drilling.

OLD PENETRATION MACADAM SCARIFIED FOR BASE

The right of way for the new mixed macadam, the name for a hot-mix type of pavement common to the Province of Ontario, was along an old macadam road

with some relocation to eliminate sharp curves and a few grades. The old road was broken up with a scarifier attached to a Caterpillar Sixty. This tractor also pulled the Adams leaning wheel grader which carried a 10-foot blade. All the curves on the new road were widened 3 feet on the inside and super-elevated a maximum of 18 inches. The largest cut on the job was from 8 to 10 feet average depth, a sidehill cut, and an Erie steam shovel with a $\frac{3}{4}$ -yard bucket took out 800 yards in one 11-hour day, cleaning up the cut in quick time.

The setting up of the camp was started April 20, 1931, and the grading on April 23. The plant was moved in by freight from Dunville, Ont., and was started May 14. The plant was located in the reformatory grounds at the quarry about one mile dead haul from the Guelph end of the work.

The grading on the road was all handled by the Adams grader and a Wehr one-man power grader with a Waterous 12-ton steam roller working on the fills and grade. The Department of Public Highways specifications for King's Highway construction of asphaltic mixed macadam call for a 21-foot black base 3 inches thick when consolidated and a similar 3-inch top course 20 feet wide with a seal coat of liquid asphalt and $\frac{3}{8}$ -inch stone chips. The whole roadway has a crown of $2\frac{1}{2}$ inches. The shoulders which are 5 feet wide are rolled and the slopes beyond them in fills are carried out on a $1\frac{1}{2}$ to 1 slope. In cut the ditch slope adjacent to the shoulder is 2 to 1 and 3 feet wide with the ditch proper 2 feet wide and the far slope carried up on a $1\frac{1}{2}$ to 1 slope. These are the revised specifications of February 12, 1931.

FORM SETTING AND FINE GRADE

The line and grade for the road were set on one side and transferred to the far side with a level by the contractor. Forms for the base course were set first on the side with the line and then the far side. The forms consisted of 3 x 6-inch spruce in 16-foot lengths held securely in place by three or four $\frac{3}{4}$ x 15-inch iron pins bent over $1\frac{1}{2}$ inches at the top to hold down the forms or screeds as the roller passed over them. Four men were used in setting the forms with a hand crew of about fourteen men on the grade. The Wehr grader also ran in between the forms and took out any excess dirt or smoothed up the grade that was cut up by the asphalt trucks with their $5\frac{1}{2}$ -ton loads.

THE HOT-MIX PLANT AT THE QUARRY

To produce the 25,000 tons of black base for this 5.85-mile job the contractor installed a 2,000-yard Cummer asphalt plant at the reformatory quarry. There a crew of fourteen men under the direction of George "Tiger" Allen kept the hot stuff running out to the road at the rate of 495 tons average per day. A Barber-Greene batching loader was used at the crushed stone stockpile to load a shuttle truck which hauled the material to the nearer receiving or feeding hopper over the bucket elevator to the auxiliary drier. The same truck also hauled completely around the plant to the second bucket elevator which fed directly to the regular drier of the Cummer plant. A Waterous auxiliary drier was used because the standard drier was not sufficient to handle all the material when the aggregate



GRADING AND PAVING OPERATIONS

1. An Adams grader cutting the edge on a relocation. 2. A Wehr power grader working on fine grade. 3. The type of pins used to hold the wooden screeds or forms. 4. The hot-mix trucks were reversed on a Blaw-Knox turntable to prevent cutting up the shoulders. 5. Spreading the top with a 10-foot Galion box. 6. A straight-edge cut to contour on one side was used constantly across the road to maintain the crown and along the road to check smoothness.

7. Rolling the top course. Note the method of dampening the road rolls by means of fiber mats.

was wet. With the extra drier it was not found necessary to use more than one of the two fuel oil burners in the regular drier under ordinary conditions. Where crusher-run aggregate was used with a maximum of 2-inch stone both elevators were used for stone. In this case there was a dearth of fines so that a car of fines was kept on the siding and unloaded by two men to a shuttle truck which dumped at the base of the elevator to the auxiliary drier where the man there fed it in with the stone in small quantities. The auxiliary drier, heated by fuel oil burners, delivered the hot aggregate to a chute which carried the stone and fines to the regular bucket elevator and thence through the plant drier. The auxiliary drier was driven by a separate steam engine while the plant proper was run by a Rumley Oil-Pull tractor engine using coal oil for fuel.

The labor on the plant included the operator on the Barber-Greene loader, the truck driver delivering stone, the two men on bucket elevators controlling the rate of flow of the stone and adding the fines, one man on the Rumely engine, one man on the 60-horsepower boiler, a burner man and a greaser. In addition there were the two men in the car unloading fines and the

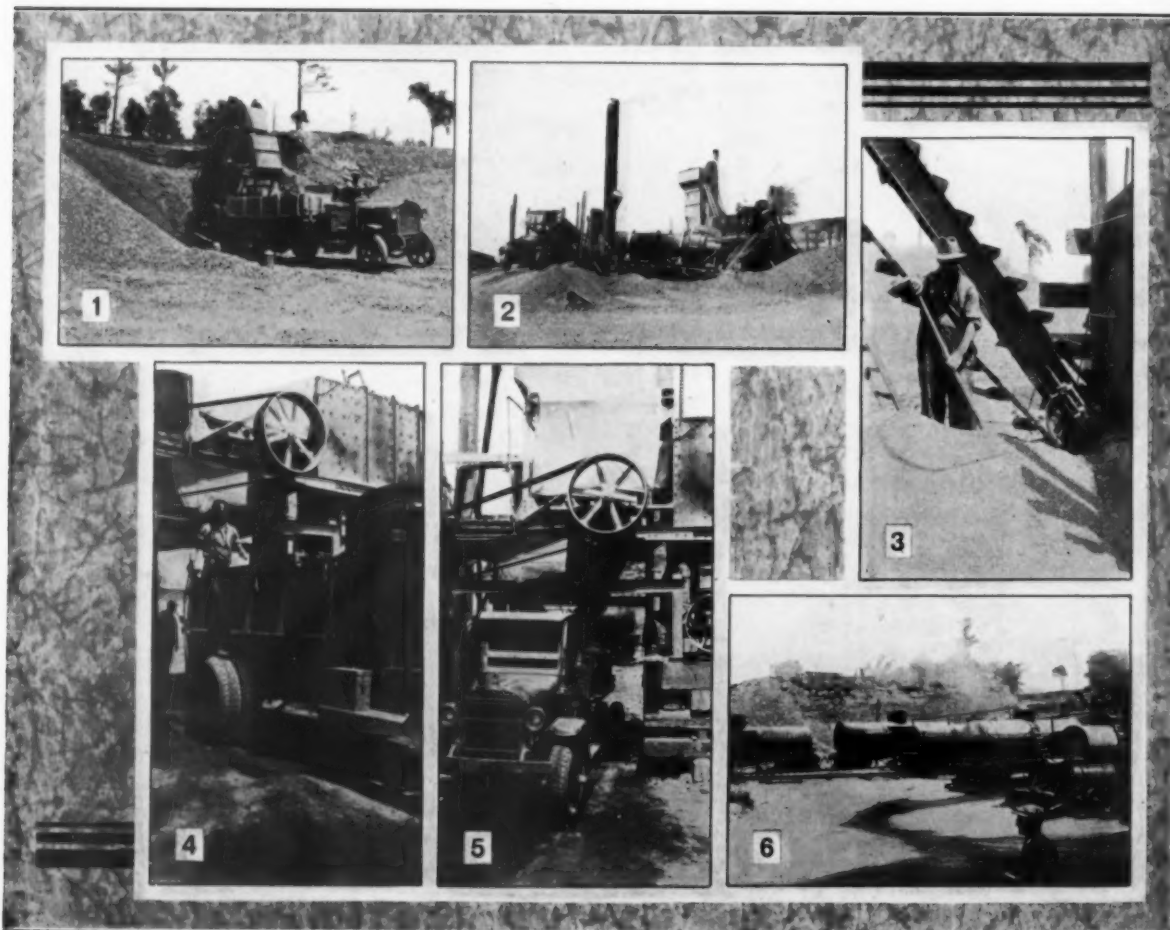
truck driver for that work, a handy man, and on the plant one asphalt man and a stone man.

NOVEL HANDLING OF ASPHALT AND FUEL OIL

The Godson Company purchased two tank cars which were placed on broken spurs back of the asphalt plant. One of these was used for asphalt storage and the other for fuel oil storage. As cars of asphalt were received on the regular spur track serving the plant they were heated with steam from the boiler at the plant and the asphalt forced into the storage tank car by a Kinney asphalt pump. When fuel oil tank cars were received the material was pumped direct to the fuel oil tank on top of the asphalt plant or to the storage tank on the broken spur.

To speed up the handling of the trucks at the plant a batch box holding five batches of hot mix was built beneath the mixer. Thus a truck had only to wait for the mixing of two additional batches before it could pull out and head for the road. Each batch consisted of 70 pounds of asphalt and the remainder of the 1,500-pound batch was of hot stone. Each truck hauled a $5\frac{1}{4}$ -ton load.

The sheet iron bodies of the trucks were sprayed



THE ASPHALT PLANT AT THE QUARRY OF THE PROVINCIAL REFORMATORY NEAR GUELPH, ONT.

1. Handling crushed stone with a B-G loader from a stockpile to the GMC shuttle truck. 2. The shuttle truck delivering stone to the cold material elevator of the auxiliary drier. 3. Feeding fines to the auxiliary drier. 4. Spraying a truck body before loading. 5. The trucks were quickly loaded from the 5-batch hopper beneath the mixer. 6. Fuel oil and asphalt tank cars on spur tracks adjacent to the plant.

every three or four trips with fuel oil to prevent the asphalt sticking to the metal. A novel device to speed up this process was set up next to the drive where the trucks backed in under the batch box. A vertical tank of about 60 gallons capacity with a glass gage held the fuel oil and a tap on the air line to the asphalt kettle provided pressure for spraying the oil into the bodies. In cold weather the bodies were sprayed more frequently.

Two Kinney pumps with steam-jacketed lines handled the asphalt from the tank cars to the storage tank and to the heating kettles on the Cummer plant. The hot asphalt ran by gravity to the receiver from which it was forced as required to the weighing bucket by compressed air furnished by a Westinghouse locomotive-type compressor. A genuine safety weigh bucket had been designed by the foreman to prevent hot asphalt blowing over when it was run from the pipe line into the weigh bucket or from the bucket to the pug mixer. The usual bucket is merely a half cylinder which is tipped to dump. This bucket was covered, with the pipe running through a hole in the top and had a sluice gate type control for delivering the asphalt to the mixer. In this way no asphalt was wasted and all danger of burns was eliminated. All asphalt for this job was furnished by Imperial Oil, Ltd.

A small reciprocating pump on the bank of the Speed River about 100 feet from the plant furnished water for the boilers. Canadian Scale Co. 20-ton weigh scales at the entrance to the plant completed the equipment. Each truck with its load was weighed and tare deducted as the payment for the road was based on tonnage produced and delivered to the road.

PLACING THE HOT MIX

As the trucks approached the section where the hot mix was being placed they were turned on a Blaw-Knox turntable and backed to the spreader boxes. The black base was spread from two Galion spreader boxes each handling a 10½-foot strip on base and a 10-foot strip on top. To prevent any depression where the skids of the spreader boxes ran on the road the back aprons controlling the rate of application or depth of the material was cut with two slots to spread a thicker layer at those points. These rolled out under the rollers and prevented any depressions developing.

The fleet of delivery trucks ran from eleven maximum down to three with a Chevrolet utility truck hauling forms, and carrying a water tank to take care of the steam rollers.

The road crew made up of three rakers, two box men, two shovelers, one straight-edge man who also acted as water boy and the foreman. The straight-edge was used on each half section of road longitudinally as well as transversely to insure a proper cross section before the rolling had progressed too far to make corrections difficult. One side of the straight-edge was cut to contour of the road and the other side straight to detect any depressions or high spots in the pavement. Two three-wheel Galion gas rollers weighing 12 tons were maintained on the job rolling top and base. A 12-ton steam roller was also used when the output of asphalt required it. The mix for both top and base was the same except that more care was exercised to add a greater proportion of



A Nice Piece of Shoulder Work

finer when top was being run. It was the practice to run base in the afternoon and top over the same section the next morning. In this manner the base was not left uncovered a sufficient length of time to permit traffic to track dirt onto the base. In this type of construction the road is open to traffic at all times thus having the distinct advantage that no detours are required.

A seal coat or surfacing coat of hot liquid asphalt and ¾-inch stone chips, spread by a mechanical spreader, was rolled in as the final work on the pavement. The top presented an appearance between that of a fine surface texture penetration macadam as built in most of the States and a sheet asphalt. Its riding qualities are good and from roads which have been down for a number of years it is obvious that it stands up under the deep frosts for which Ontario is noted.

COMPLETING THE SHOULDERS

The 5-foot shoulders were completed immediately in back of the paving so that the road presented an attractive appearance at once. The line of the slopes was dressed accurately and the line between the slope and horizontal section was well defined. The shoulder crews were equipped with shovels with 5-foot handles making the trimming a matter of a few minutes without moving onto the shoulder and shifting around in the process.

PERSONNEL

This 5.85-mile project was built by the Godson Contracting Company of Toronto, Ontario, with George W. Porter as General Manager and Norman L. Wilson as Superintendent of Construction. For the Ontario Department of Public Highways the work was directed by S. A. Cummingford, Resident Engineer, with H. Denison and E. Paisley as Inspectors.



The Editor Comments —

Put Your Faith in NEW Equipment

In the "grief" that one is bound to see in the course of traveling some 12,000 miles and visiting about one hundred construction projects each year, there is one outstanding fault to be found with many contractors. They try to get "just one more year's work" out of the old crane or paver, or finishing machine or shovel. Then they bank their whole production schedule on the continuous performance of every piece of equipment, making no allowance for the old crane that is handling all the aggregate from the cars to the batchers. When that goes out no amount of stockpiles nor the best organization in the world around the latest model paver will be worth a rap.

One particularly sad case came to my attention this summer where a contractor was handling a job nearly 7 miles long and wanted to get it out in a hurry. He planned to use two pavers running in parallel to speed the work. One of them was overhauled during the winter and in good condition, according to the superintendent who personally had supervised the work. The other was also an old machine and was "known" to be in fair shape so it was given a coat of paint. The work started with one paver and there were a series of breakdowns culminating at the time when, after the single paver had been working for some time, it was decided to speed up work by running the two in parallel. On the day that the second paver was started over the road from the yard the first broke a casting so that it was unsafe to move it under its own power. The second was still 2 miles away when the crawler on one side came off and held up the operation of the paver for another day. All work stopped for that day with only a scant hundred feet of pavement laid.

If the contractor had been fortunate enough to have before him the schedule of rental and depreciation that appeared in the July issue of *CONTRACTORS AND ENGINEERS MONTHLY* he could have seen that the life of a 27-E paver is 90 per cent over at the end of the third year even when it has had the best of care with overhauling after every job. That schedule was prepared by a practical group of men that know their equipment and you can't beat the game. Buy new equipment when the probable life of your old machine is ended. And do you remember the advice of C. F. Lytle in his article in the October, 1929, issue of *CONTRACTORS AND ENGINEERS MONTHLY*, "Are You Kidding Yourself About Your Used Equipment?" That is worth reprinting for the benefit of the men who think they can squeeze more out of their machinery. The article was written mostly to show the financial side of the game but bears also on the purchase of new equipment which needs more thought.

Overhead keeps right on. You may be able to cut off your labor crew in fifteen minutes or a half hour after

a break and think you are stopping your expenses but the job overhead stalks right along. It is the linear feet of pavement that you get in day after day that counts and if the investment in new equipment will keep that strip of concrete moving ahead every hour during the working day you can make a profit. But if you are trying to make an old machine do its stuff for an extra season and it breaks down repeatedly you are presenting your profits to the machine and not to your bank account.

Put your faith in NEW equipment!

The History of the Use of Bulk Cement

Again bulk cement appears as a topic on this page. It is inevitable when a new process or method is developed that interest is shown in its history. Through the cooperation of several groups, we have been able to secure what we believe is an accurate history of the use of bulk cement in this country.

The first extensive use of bulk cement for highway work was in 1920 in Maricopa County, Arizona, where Twohy Brothers used it for a time in the construction of 140 miles of concrete pavement. The cement was unloaded by a vacuum process, weighed on automatic scales, and loaded into batch boxes through canvas chutes. This method proved entirely satisfactory from the standpoint of dustlessness and economy, but because of some difficulties with the mechanism, was discarded until a more dependable air lock could be developed.

In 1922, the Iowa Highway Commission permitted the use of bulk cement on a state highway in Blackhawk County. The cement was shipped in grain cars and was unloaded and batched by hand. It proved so satisfactory to everyone that contractors in other parts of the state began to use bulk cement. During 1928 about 70 per cent of the cement that went into Iowa pavements was delivered in bulk, and in 1929 and 1930 this increased to 100 per cent.

In 1926, Minnesota had its first experience with bulk cement when two contractors used it. In 1927, one or two other contractors installed bulk cement handling equipment, and the results were very satisfactory. In 1928 the State began to furnish cement, and they felt justified in buying it in bulk. Since 1928, only bulk cement has been used for paving in Minnesota.

According to a survey made by C. S. Johnson Co. in December, 1930, and quoted previously in these pages, bulk cement was then being used in 75 per cent of state road work in Nebraska, Oklahoma and Wisconsin, 20 per cent in Kansas, 10 per cent in Ohio, 5 per cent in Illinois, 2 per cent in Indiana and 1 per cent in Pennsylvania.

Theodore Reed Kendall

THE EQUIPMENT DISTRIBUTOR

The Twenty-Ninth
Annual Convention
of the
American Road Builders
Association
held in Detroit
January 11-15, 1932



The Huge Hangar
at the Detroit
Municipal Airport
where the Exhibits
of Road Machinery
and the Meetings
will be held

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Clark-Wilcox Co. (Frank P. Wilcox).....	12	Lane, Jack D. (B. Hayman Co., Inc.).....	15	Snyder, Newell L. (E. K. S. Equipment Co.).....	10
Cleveland, L. N. (Conc. Machy. & Supply Co.).....	11	Latture Equipment Co., J. L. (J. L. Latture).....	15	Soestheim, W. R. (Superior Construction Equipment Co.).....	7
Clinton & Heid Co. (L. L. Clinton).....	11	Lawrence-Goodling Co. (J. C. Lawrence).....	11	Southern States Equipment Co. (R. S. Byron).....	14
Clyde Equipment Co. (Oscar B. Bjorge).....	3	Leland Equipment Co. (H. R. Leland).....	14	St. John, Russell (Canadian Equipment Co., Ltd.).....	8
Collins, Harry C.....	11	Levy, Neville (Equitable Equipment Co.).....	15	Star Machinery Co. (W. B. Rabel).....	9
Concrete Mach. & Supply Co. (L. N. Cleveland).....	11	Lind Co., G. C. (G. C. Lind).....	12	Stephens, S. A. (Hopkins-Osborn, Ltd.).....	15
Connelly Machinery Co. (Frank B. Connelly).....	4	Lindrooth, Shubart & Co. (Benedict Shubart).....	12	Sterling Tractor Equipment Co. (Joseph W. Louche).....	10
Construction Equipment Co. (H. G. Ferris).....	13	Llewellyn Machinery Corp. (L. D. Llewellyn).....	15	Sith Co., C. L. (C. L. Sith).....	9
Conway, D. J. (H. O. Fenn Machinery Co.).....	15	Loder & Sharp, Inc. (T. C. Loder).....	10	Stone, Mead W. (George Malvese & Co.).....	6
Cooke, H. J. (O. R. Peterson-Ersted Co., Ltd.).....	10	London Concrete Machinery Co., Ltd. (H. Pocock).....	15	Stoner, E. G. (Beckwith Machinery Co.).....	5
Corby Supply Co. (J. B. Corby).....	15	Louche, Joseph W. (Sterling Tractor Equipment Co.).....	15	Superior Construction Equipment Co. (W. R. Soestheim).....	7
Cox & Co., A. H. (G. H. Jamison).....	5	Lower Co., W. B. (C. L. Sigman).....	15	Surbert, B. J. (Dyer Sales Machinery Co.).....	12
Craven Co., E. F. (E. F. Craven).....	5	Louis Co., Inc., John (John C. Louis).....	16	Syracuse Supply Co. (Thomas D. Grady).....	15
Cunningham-Ortmayer Co. (E. J. Cunningham, C. G. Ortmayer).....	10	Louisiana Tractor & Equipment Co., Inc. (A. J. Thomas).....	5	Thomas, A. J. (Louisiana Tractor & Equipment Co., Inc.).....	5
Davis, Inc., Norris K. (Alfred E. Mason).....	14	Lyman, John D. (Tractor & Equipment Co.).....	16	Tinklepaugh, John R. (Beckwith Machinery Co.).....	5
Dickerson, W. F. (Inter-State Equipment Co.).....	14	Malvese & Co., Geo. (George Malvese, Mead W. Stone).....	6	Tractor & Equipment Co. (Stanley E. Bates, Henry F. Holloway, Jr., John D. Lyman).....	16
Dodd, J. W.....	11	Marshall, F. H. (Memphis Tractor Co.).....	12	Tractor & Machinery Co., Inc. (A. E. Hannan).....	7
Dorn, Chris (I. E. Schilling Co.).....	7	Martin Machinery Co., E. A. (E. A. Martin, E. A. Martin, Jr.).....	11	Trevor Co., Inc., H. B. (H. B. Trevor).....	9
Drake Tractor & Equipment Co. (J. S. Drake).....	13	Mason, Alfred E. (Norris K. Davis, Inc.).....	11	Tulley Equipment Co. (W. D. Tulley).....	13
Dravo Equipment Co. (J. D. Berg).....	13	Matchette, P. L. (The Victor L. Phillips Co.).....	4	Tweidt Co., Inc., The Robert T. (Robert T. Tweidt).....	15
Drott Tractor Co., Inc. (E. A. Drott).....	12	Mattheis, Fred (Hedge & Mattheis Co.).....	10	Usher, H. P. (Smith Booth Usher Co.).....	3
Dyer Sales & Machinery Co. (B. J. Surret).....	12	McCarty Co., Inc., Charles J. (Maxwell S. Inman, Charles J. McCarty).....	6	Vann, J. A. (Young & Vann Supply Co.).....	15
Earle Equipment Co., The (Geo. L. Earle).....	12	McCombs, C. E. (W. M. Pattison Supply Co.).....	13	Voigt, M. G. (Alamo Iron Works).....	3
Eastern Tractors Co., Inc. (R. L. Files).....	11	McDivit, J. A. (The Henry H. Meyer Co.).....	10	Walker, E. G. (Smith Booth Usher Co.).....	3
Edelen & Boyer Co. (T. J. Stone Edelen).....	11	McDonald Tractor-Equipment Co. (H. L. McDonald).....	5	Walsh Equipment Co., W. T. (W. T. Walsh).....	7
Edgerly, D. M. (Interstate Machy. & Supply Co.).....	10	McGavren, W. R. (The Victor L. Phillips Co.).....	4	Waterhouse, Clifford.....	13
E. K. S. Equipment Co. (Newell L. Snyder).....	10	McGredy, R. H. (Geo. D. Case Co., Inc.).....	14	Weber Implement & Automobile Co. (Geo. Weber).....	13
Elphinstone, Inc., D. C. (D. C. Elphinstone).....	8	McShane, T. S. (American Machinery & Supply Co.).....	16	Weaner, A. M. (Wilson-Weaner-Wilkinson Co.).....	16
Engineering Products Co. (Arthur Prausnitz).....	10	Mechanical Supplies Co., The (J. B. Miller).....	10	Wells, W. R. (Arizona Tractor & Equipment Co.).....	10
Equipment Co., The (A. L. Felch).....	14	Meffley, George L. (H. W. Moore Equipment Co.).....	14	Western Contractors Supply Co. (T. W. Barrett).....	16
Equitable Equipment Co. (Neville Levy).....	5	Memphis Tractor Co. (F. H. Marshall).....	12	Western Material Co. (E. K. Hurst).....	3
Essick & Co. (Newman Essick).....	12	Meyer Co., The Henry H. (A. McDivit).....	10	Western Road Machinery Co. (Edward I. Kropp).....	9
Everett & Co., R. B. (C. H. Neblett).....	3	Milburn Machinery Co. (C. G. Milburn).....	14	Whayne Supply Co., Roy C. (Roy C. Whayne).....	3
Farnum, Eldon M. (The Geo. F. Smith Co.).....	4	Milian Machinery Co. (Vicente B. Milian).....	10	Wheeler Equipment Co., The (L. M. Wheeler).....	11
Feenaughty Machinery Co. (W. O. Feenaughty).....	15	Miller, J. B. (The Mechanical Supplies Co.).....	10	Wilcox, Frank P. (Clark-Wilcox Co.).....	12
Felch, A. L. (The Equipment Co.).....	14	Miller Equipment Co., Inc., The (Wallace Bigelow, James C. Miller).....	14	Willard Equipment Limited (A. W. Willard).....	6
Ferris, H. G. (Hofius-Ferris Equipment Co.).....	4	Miller, O. H. (Choctaw Culvert & Machinery Co.).....	5	Wilson, C. A. (Perry & Wilson Equipment Co., Inc.).....	10
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Files, R. L. (Eastern Tractors Co., Inc.).....	11	Musens, Ltd. (W. H. C. Musens).....	7	Wohl, Miss M. A. (Northwest Equip. Co., Inc.).....	16
Finney, Carl (Fickelsen-Finney Equipment Co.).....	14	Nagle, John A. (Badger Tractor & Equipment Co.).....	11	Yancey Bros., Inc. (Earle Yancey).....	7
Fletcher Equipment Co., Inc. (H. W. Fletcher).....	13	Neblett, C. H. (R. B. Everett & Co., Inc.).....	10	Yancey Tractor Co. (L. D. Yancey).....	7
Floyd, Jr., N. (The Hubbard-Floyd Co., Inc.).....	3	Nelson, Roy E. (Howard-Cooper Corp.).....	10	Young & Vann Supply Co. (J. A. Vann).....	15
Fucha Equipment Co. (A. A. Fucha).....	3	Nixon-Hasselle Co. (Robert R. Nixon).....	3	Ziegler Machinery Co., Geo. W. (Geo. W. Ziegler).....	6
Funkhouser Equipment Co. (V. E. Funkhouser).....	14	Noble Co., The K. B. (K. B. Noble).....	4	Ziegler Co., Inc., Wm. H. (Wm. H. Ziegler).....	4
Garfield & Co. (C. A. Garfield).....	14				
Garlinghouse Brothers (A. F. Garlinghouse, L. H. Garlinghouse).....	10				
Gartner Co., F. W. (F. W. Gartner).....	8				
General Construction Material Co., Ltd. (Donald L. Boulanger).....	12				



Oscar B. Bjorge, Manager,
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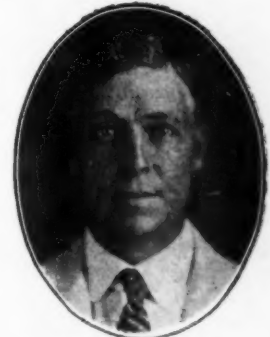


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Booth Usher Co., Los Angeles,
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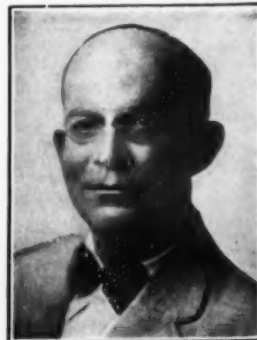
Leon Rosenbaum, President, J. Jacob Shannon & Co., Philadelphia, Pa.



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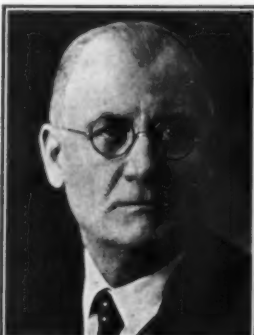
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Stith Co., Columbus, Ohio



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John A. Nagle, President, Badger Tractor & Equipment Co., Milwaukee, Wis.



Thomas L. Barrett, Louisville, Ky.



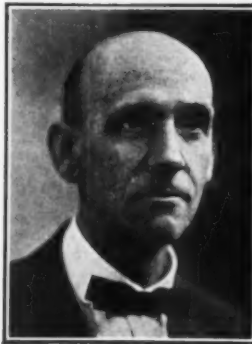
G. C. Phillips, President, G. C. Phillips Tractor Co., Birmingham, Ala.



Morton Photographs
Stuart S. Smith, Vice President, Jenison Machinery Co., San Francisco, Calif.



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H. R. Leland, President, Leland Equipment Co., Tulsa, Okla.



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J. Walker Wilson, Manager,
J. Walker Wilson Machinery
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Mgr., Memphis Tractor Co.,
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Mgr., Drake Tractor & Equip.
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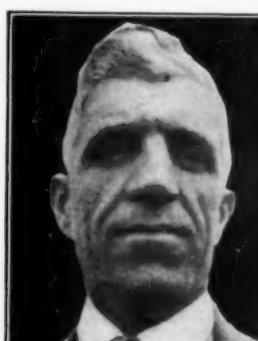
J. M. Howard, Mgr., Contrac-
tors Equip. Dept., The Wm. T.
Johnston Co., Inc., Cincinnati,
Ohio



T. C. Loder, President, Loder
& Sharp, Inc., Philadelphia, Pa.



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Kent Pope, President, The Pope Equipment Co., Cleveland, Ohio



E. A. Drott, President, Drott Tractor Co., Inc., Milwaukee, Wis.



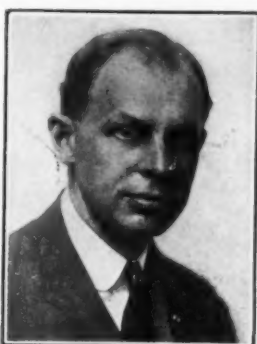
A. L. Pavey, Vice President, Inter-State Equipment Co., Aberdeen, S. D.



John R. Tinklepaugh, Albany and Livingston, N. Y.



Ole K. Olsen, New Orleans, La.



Geo. Weber, President, Weber Imp. & Auto Co., St. Louis, Mo.

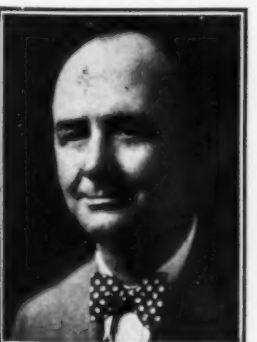


T. E. Burnite, President, Burnite Machinery Co., Denver, Colo.



MacEwan-Harris

W. D. Talley, Talley Equipment Co., St. Louis, Mo.



Clifford Waterhouse, Jackson, Miss.



H. Y. Smith, Milwaukee, Wis.



W. A. Hood, Treasurer & Manager, Monarch Equipment Co., St. Louis, Mo.



S. T. Hatcher, S. T. Hatcher & Co., St. Louis, Mo.



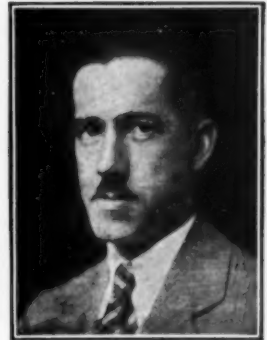
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Allan MacEwan Portrait
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ver, Colo.



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Geo. D. Case Co., Inc., Horse-
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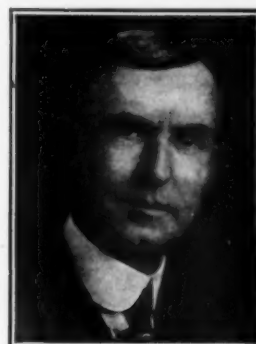
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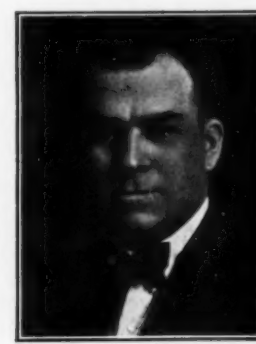
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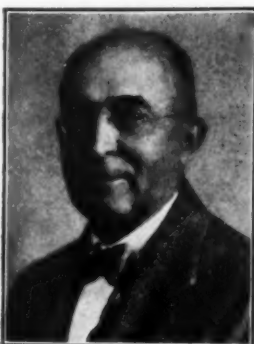
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Handman Co., Cincinnati, Ohio



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Who's Who
among
Manufacturers
in the
Construction Field

The Equipment Distributor

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L. J. Kanitz, Gen. Sales Manager, Continental Motors Corp., Detroit, Mich.



B. L. Boye, Standard Oil Co. of N. Y., New York, N. Y.



Charles T. Hvass, President, Chas. Hvass & Co., Inc., New York, N. Y.



W. McK. White, Pres. & Gen. Mgr., Chausse Oil Burner Co., Elkhart, Ind.



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Who's Who Among Manufacturers in the Construction Field



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W. C. Fleming, Vice Pres. & Gen. Sales Mgr., The Euclid Ed. Machy. Co., Cleveland, Ohio



A. P. Armington, Pres. & Gen. Mgr., The Euclid Road Machinery Co., Cleveland, Ohio



Henry N. Schramm, President, Schramm, Inc., West Chester, Pa.



A. O. Witt, Manager, Sales Promotion, Schramm, Inc., West Chester, Pa.



H. B. Burlew, Vice President, Tompston, Kenly & Co., Ltd., Chicago, Ill.



C. A. Laster, President, Clyde Iron Works Sales Co., Duluth, Minn.



J. T. Frost, General Sales Manager, Clyde Iron Works Sales Co., Duluth, Minn.



B. C. Briody, Vice President & Manager, Highway Division, Truscon Steel Co., Youngstown, Ohio



W. S. Miller, Secretary & Sales Manager, Hardsoc Wonder Drill Co., Ottumwa, Iowa



Frank Moore Studio
Lion Gardiner, Pres., Lakewood Eng. Co., Columbus, Ohio



B. N. Clark, Mgr. of Sales, Heltzel Steel Form & Iron Co., Warren, Ohio



J. N. Heltzel, President and Treasurer, Heltzel Steel Form & Iron Co., Warren, Ohio



O. L. Dent, Pacific Coast Manager, Ransome Concrete Machinery Co., Dunellen, N. J.



H. C. Peters, Midwest Manager, Ransome Concrete Machinery Co., and Transit Mixers, Inc.



A. P. Robinson, Sales Manager, Ransome Concrete Machinery Co., and Transit Mixers, Inc.



George C. Ellis, Pres., Ransome Concrete Machinery Co., and Transit Mixers, Inc.



Walter A. Olsen, Pres. & Gen. Mgr., Four Wheel Drive Auto Co., Clintonville, Wis.



Edwin F. Leigh, Vice Pres. and Gen. Mgr., Marion Malleable Iron Works, Marion, Ind.



Edwin F. Hill, Jr., Pacific Coast Sales Mgr., Transit Mixers, Inc., Oakland, Calif.



Ray McLean, Eastern Sales Mgr., Transit Mixers, Inc., Oakland, Calif.



Frank R. Kentopp, Wis. State Sales Mgr., Northfield Iron Co., Northfield, Minn.



C. L. Brown, President and General Manager, Northfield Iron Co., Northfield, Minn.



C. E. Erickson, Sales Mgr., Northfield Iron Co., Northfield, Minn.



Paul C. La Blant, Vice Pres., in Charge of Sales, M. W. Lubricants Corp., Minneapolis, Minn.



A. E. Ellis, Vice Pres., Pittsburgh Testing Laboratory, Pittsburgh, Pa.



G. F. Ahlbrandt, Gen. Mgr. of Sales, The American Rolling Mill Co., Middletown, Ohio



Bennett S. Chapple, Jr., Development Dept. of Sales Div., The American Rolling Mill Co., Middletown, Ohio



Charles F. Smith, President, Smith Engineering Works, Milwaukee, Wis.



Ernest Schaefer, Secretary and Sales Manager, The Gustav Schaefer Co., Cleveland, Ohio



Kenneth Lindsay, Vice Pres. & Gen. Sales Mgr., Iowa Manufacturing Co., Cedar Rapids, Iowa



A. G. Kerr, Mgr. of Sales, Beebe Bros., Seattle, Wash.



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R. Birdsell, Vice Pres. & Sales Mgr., Perfer Corp., Milwaukee, Wis.



L. T. McGuire, Asst. Sales Mgr., The Byers Machine Co., Ravenna, Ohio



H. C. Beckwith, President and General Manager, The Byers Machine Co., Ravenna, Ohio



P. T. Redfern, Sales Mgr., The Byers Machine Co., Ravenna, Ohio



R. E. Howard, Vice Pres. in Charge of Sales, Anthony Co., Streator, Ill.



F. L. Stone, Gen. Sales Mgr., Universal Atlas Cement Co., Chicago, Ill.



Underwood & Underwood
B. P. Affleck, Pres., Universal Atlas Cement Co., Chicago, Ill.



W. S. Railsback, President, New England Road Machinery Co., Boston, Mass.



M. A. Fraher, John Deere Tractor Co., Waterloo, Iowa



F. H. Moore, Secretary-Treasurer, Equitable Asphalt Maintenance Co., Kansas City, Mo.



Arthur S. Hughes, President, The Hughes-Keenan Co., Mansfield, Ohio



John A. Sauerman, Pres., Sauerman Bros., Inc., Chicago, Ill.



D. D. Guilford, Vice President-General Sales Manager, Sauerman Bros., Inc., Chicago, Ill.



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H. E. Orr, Adv. Mgr., Cleveland Tractor Co., Cleveland, Ohio



J. P. Gilson, Pres. & Gen. Mgr., Gilson Bros. Co., Fredonia, Wis.



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J. S. Helm, Gen. Mgr., Asphalt Sales Dept., Standard Oil Co. of N. J., New York, N. Y.



Photograph by Bachrach
Charles A. Lynch, Vice Pres. & Gen. Mgr., Foote Co., Inc., Nunda, N. Y.



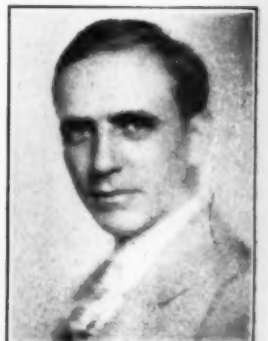
Louis Wiard, Pres., Wiard Plow Co., Batavia, N. Y.



Stuart R. Ives, Vice Pres. & Gen. Mgr., Armco Culvert Mfrs. Assn., Middletown, Ohio



A. C. Flothow, Pres., Everhot Manufacturing Co., Maywood, Ill.



Paul Gardner, Pres., DeWalt Products Corp., Lancaster, Pa.



George F. Schlesinger, Chief Engr. & Managing Dir., National Paving Brick Assn., Washington, D. C.



Leo Madden, Vice Pres. in Charge of Sales, Stover Mfg. & Engine Co., Freeport, Ill.



W. M. Neill, Sales Manager, Bates Valve Bag Corp., New York, N. Y.



W. S. Graves, Truck Sales Manager, Dodge Brothers Corp., Detroit, Mich.



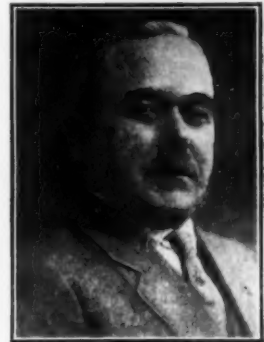
A. B. Shufeldt, General Manager, Universal Road Machinery Co., Kingston, N. Y.



Frank B. Phinney, N. E. Manager, Universal Road Machinery Co., Kingston, N. Y.



G. D. Finney, Sales Manager, Grader Dept., Rome Mfg. Co., Rome, N. Y.



J. M. Patterson, General Manager, Grader Dept., Rome Mfg. Co., Rome, N. Y.



Arthur E. Miskin, Manager, Miskin Scraper Works, Ucon, Idaho



Underwood & Underwood
W. B. Green, Vice Pres., Barber-Greene Co., Aurora, Ill.



H. H. Barber, Pres., Barber-Greene Co., Aurora, Ill.



Franklin D. Hooper, Sales Manager, Barber-Greene Co., Aurora, Ill.



Earle S. Phillips, Good Roads Machinery Co., Inc., Kennett Square, Pa.



Joe L. Long, Chicago Representative, E. D. Etnyre & Co., Inc., Oregon, Ill.



Oliver F. Rinderle, President-General Manager, Brown Clutch Co., Sandusky, Ohio



William I. Buhl, Pres., The Buhl Co., Chicago, Ill.



Frank H. Smith, Chairman, Board of Directors, Portland Cement Assn., Chicago, Ill.



William M. Kinney, Vice Pres. & Gen. Mgr., Portland Cement Assn., Chicago, Ill.



John S. Boyd, Vice Pres., The Gallion Iron Works & Mfg. Co., Gallion, Ohio



J. E. Core, Sales Manager, Jackson Manufacturing Co., Harrisburg, Pa.



H. S. Greene, General Sales Mgr., Chain Belt Co., Milwaukee, Wis.



Edwin F. Jones, District Mgr., Erie Steel Construction Co., Erie, Pa.



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J. H. Pennybacker, Managing Director, The Asphalt Institute, New York, N. Y.



Frank H. Dewey, General Sales Manager, Wood Hydraulic Hoist & Body Co., Detroit, Mich.



H. M. Davison, Excavator Sales Mgr., Harnischfeger Sales Corp., Milwaukee, Wis.



C. B. Foster, Asst. Excavator Sales Mgr., Harnischfeger Sales Corp., Milwaukee, Wis.



Wm. H. Hassenplug, Excavator Sales Dept., Harnischfeger Sales Corp., Milwaukee, Wis.



H. H. Baker, Secy., Sterling Wheelbarrow Co., Milwaukee, Wis.



E. B. Mallory, Vice President, Climax Engineering Co., Clinton, Iowa



C. N. Maurer, Dir., Highway Sales Div., The Hell Co., Milwaukee, Wis.



Julius P. Hell, Pres., The Hell Co., Milwaukee, Wis.



Gus H. Olson, Manager, Crane & Shovel Dept., Link-Belt Co., Chicago, Ill.



George B. Curd, Cincinnati, Ohio



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Frank H. Smith, Sales Manager, Farm Tools, Inc., Mansfield, Ohio



Robert H. Morse, Pres. & Gen. Mgr., Fairbanks, Morse & Co., Chicago, Ill.



S. S. Poor, General Sales Manager, General Tire & Rubber Co., Akron, Ohio



L. E. Dauer, Sales Mgr., Trackson Co., Milwaukee, Wis.



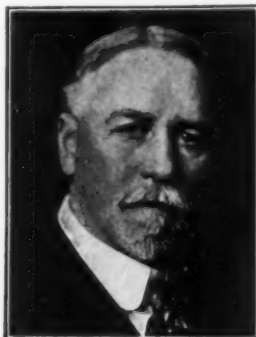
W. H. Stienke, Vice President & General Manager, Trackson Co., Milwaukee, Wis.



H. D. Van Doorn, Assistant Manager, Trackson Co., Milwaukee, Wis.



F. H. Edson, Pres., The Lauson Corp., New Holstein, Wis.



Clarence E. Bement, Vice President and General Manager, Novo Engine Co., Lansing, Mich.



S. M. Hunter, Sales Manager, Novo Engine Co., Lansing, Mich.



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J. R. Wemlinger, President, Wemlinger, Inc., New York, N. Y.



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H. W. Bonnell, Sales Mgr., Godfrey Conveyor Co., Elkhart, Ind.



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R. S. Arthur, Chicago Branch Mgr., Aeroll Burner Co., Inc., West New York, N. J.



Geo. P. Kittel, Pres., Aeroll Burner Co., Inc., West New York, N. J.



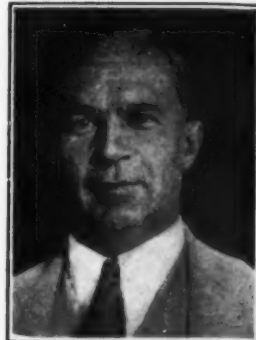
S. F. Beatty, President, Austin-Western Road Machinery Co., Chicago, Ill.



E. C. Leach, President, The Leach Co., Oshkosh, Wis.



Donald Williams, Assistant Sales Manager, Dow Chemical Co., Midland, Mich.



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Robert W. Gotshall, Equipment Mgr., Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee, Wis.



H. C. Merritt, General Mgr., Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee, Wis.



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A. B. Morton, Vice Pres. in Charge of Sales & Advertising, Butler Bin Co., Waukeesa, Wis.



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Hugh L. Rogers, Secretary, Rogers Bros. Corp., Albion, Pa.



Charles A. Rogers, President, Rogers Bros. Corp., Albion, Pa.



Louis J. Rogers, Vice President, Rogers Bros. Corp., Albion, Pa.



E. P. Page, Jr., President, The Autocar Co., Ardmore, Pa.



Theron L. Hedgpeth, Vice President & Gen. Mgr., Portable Power Tool Corp., Warsaw, Ind.



G. K. Specht, Jr., Vice President (Distribution), Hercules Products, Inc., Evansville, Ind.



L. W. Glaser, Sales Mgr., Equipment Div., Littleford Brothers, Cincinnati, Ohio



Roger S. Littleford, Littleford Bros., Cincinnati, Ohio



M. J. Sasgen, President, Sasgen Derrick Co., Chicago, Ill.



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Goddard's Studio
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K. H. Talbot, Director of Research, National Equipment Corp., Milwaukee, Wis.



N. DeWind, The Parsons Co., Div. of National Equipment Corp., Newton, Iowa



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C. J. Hug, President, The Hug Co., Highland, Ill.



Mentor Wetstein, President, The Concrete Surfacing Machinery Co., Cincinnati, Ohio



J. G. Swain, Sales Mgr., Waukesha Motor Co., Waukesha, Wis.



Harry L. Horning, President, Waukesha Motor Co., Waukesha, Wis.



C. M. Ballard, Sales Manager, Williamsport Wire Rope Co., Chicago, Ill.



H. E. Chilcoat, General Manager of Sales, Koppel Industrial Car & Equipment Co., Koppel, Pa.



H. W. Redman, Branch Manager, Koppel Industrial Car & Equipment Co., Koppel, Pa.



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D. C. Fenner, Mgr., Public Works Dept., Mack Trucks, Inc., New York, N. Y.



Boye Portrait
W. G. Juiler, Mgr., Road Oil & Asphalt Departments, Gilmore Oil Co., Ltd., Vernon, Calif.



C. R. Jahn, Sales Mgr., Commercial Sales Div., Highway Trailer Co., Edgerton, Wis.



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Howard E. Sneathen, Asst. Mgr., Truck Dept., Chevrolet Motor Co., Detroit, Mich.



C. P. Flaken, Mgr., Commercial Car Dept., Chevrolet Motor Co., Detroit, Mich.



J. G. Miller, Vice Pres. & Sales Mgr., The Baker Manufacturing Co., Springfield, Ill.



Frederick W. Allan, Pres., Contractors Machinery Corp., Batavia, N. Y.



C. E. Funk, Eastern Sales Mgr., Construction Machinery Co., Waterloo, Iowa



R. E. Choate, Pres. and Gen. Mgr., LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa



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J. W. Wickwire, Treas. & Gen. Mgr., Edson Manufacturing Corp., South Boston, Mass.



Chas. T. Topping, Pres., Chas. T. Topping Machinery Co., Aspinwall, (Pittsburgh), Pa.



Morgan Ramsay, Sales Mgr.,
Bay City Shovels, Inc., Bay
City, Mich.



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Charles S. Ackley, Vice Pres.
in Charge of Sales, McKiernan-
Terry Corp., New York, N. Y.



Earle E. Evans, Vice Pres.
in Charge of Field Operations,
McKiernan-Terry Corp., New
York, N. Y.



J. Vale Downie, Sales Manager,
Keystone Driller Co., Beaver
Falls, Pa.



D. E. Boismenu, Asst. Mgr.,
Asphalt Dept., Standard Oil
Co. of Ind., Chicago, Ill.



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Allan Jackson, Director & Vice
President of Marketing, Stand-
ard Oil Co. of Ind., Chicago,
Ill.



E. S. Cooper, Pres., Independ-
ent Pneumatic Tool Co., Chi-
cago, Ill.



M. J. Harkless, Mgr., Con-
tractors Dept., Independent
Pneumatic Tool Co., Chicago,
Ill.



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Board, Huber Manufacturing
Co., Marion, Ohio



Walter M. Dake, Joy Manu-
facturing Co., Franklin, Pa.



C. L. Mundy, Pres. & Gen.
Mgr., J. S. Mundy Hoisting En-
gine Co., Newark, N. J.



Arnold Nelson, Sales Manager,
N. P. Nelson Iron Works, Pas-
saic, N. J.



G. D. Stone, Asst. Mgr., Cen-
tral Div., Linde Air Products
Co., Chicago, Ill.



Harvey T. Gracely, General
Sales Manager, Marion Steam
Shovel Co., Marion, Ohio



J. H. Watters, Pres. & Gen.
Mgr., Marion Steam Shovel Co.,
Marion, Ohio



D. J. Shelton, Vice Pres. in
Charge of Sales, Marion Steam
Shovel Co., Marion, Ohio



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Creek, Mich.



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Elastite Prod. Div., The Philip
Carey Co., Cincinnati, Ohio



J. A. Abbott, Sales Mgr., Home-
lite Corp., Port Chester, N. Y.



W. M. Bennett, Vice Pres. &
Sales Mgr., Moritz - Bennett
Corp., Evingham, Ill.



B. M. Mitchell, Pres., The Con-
veying Weigher Co., Passaic,
N. J.



Ramon S. Gram, Director of
Sales, Marion Steel Body Co.,
Marion, Ohio



J. R. Bakstad, Mgr., Crusher &
Pulveriser Sales, Jeffrey Manu-
facturing Co., Columbus, Ohio



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Pennsylvania - Dixie Cement
Corp., New York, N. Y.



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Muskegon Pump & Generator
Co., Muskegon, Mich.



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The Toledo Wheelbarrow Co.,
Toledo, Ohio



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Fruehauf Trailer Co., Detroit,
Mich.



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& Gen. Mgr., A. Leschen &
Sons Rope Co., St. Louis, Mo.



George C. D. Lenth, Consult-
ing Engineer and Secretary,
Clay Products Association, Chi-
cago, Ill.



Earl D. Stearns, Western Sales
Manager, Robins Conveying
Belt Co., Chicago, Ill.



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Equipment Dept., The Ameri-
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Mo.



John B. Voorhees, Mgr., The
Universal Hoist & Manufac-
turing Co., Cedar Falls, Iowa



F. A. Smythe, Pres., Thew Shovel & Universal Crane Companies, Lorain, Ohio



C. B. Smythe, Vice Pres., Thew Shovel & Universal Crane Companies, Lorain, Ohio



E. H. Wilson, Asst. Gen. Mgr. in Charge of Sales, Thew Shovel & Universal Crane Companies, Lorain, Ohio



K. Edward Brunsdale, Treas. & Adv. Mgr., Pioneer Gravel Equipment Mfg. Co., Minneapolis, Minn.



A. J. Filler, Gen. Mgr., The Fandom Holist & Shovel Co., Lima, Ohio



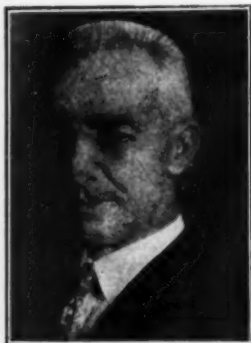
Marie J. Root, Secy.-Mgr., Root Spring Scraper Co., Kalamazoo, Mich.



F. M. Young, Pres., Young Radiator Co., Racine, Wis.



H. T. Potter, Mgr. & Adv. Dir., Ames-Baldwin-Wyoming Shovel Co., North Easton, Mass.



W. A. Riddell, Pres., W. A. Riddell Co., Bucyrus, Ohio



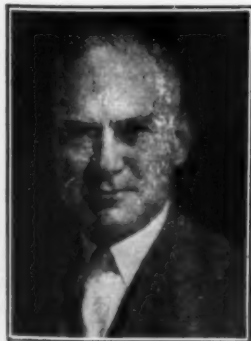
Geo. M. Schmidt, Secy.-Treas. & Gen. Mgr., W. A. Riddell Co., Bucyrus, Ohio



N. E. Jersey, Mgr., Road Machinery Sales, W. A. Riddell Co., Bucyrus, Ohio



W. B. Knickerbocker, President, The Knickerbocker Co., Jackson, Mich.



F. L. Crittenden, Vice Pres. & Gen. Mgr., National Brake & Electric Co., Milwaukee, Wis.



F. B. Peterson, Sales Mgr., National Brake & Electric Co., Milwaukee, Wis.



E. E. Brooks, Sec. & Treas., The Cleaver-Brooks Co., Milwaukee, Wis.



H. G. Simpkins, Mgr., Road Machinery Div., Wisconsin Foundry & Machine Co., Madison, Wis.

Pres. & Bennett Ill.

President, Cement Y.

r.-Treas. chen & nis, Mo.

gr., The Manufactur- s, Iowa



Frank Moore Studio
G. L. Harman, Industrial
Brownhoist Corp., Cleveland,
Ohio



W. A. Kuhlman, W. A. Kuhl-
man & Co., Toledo, Ohio



W. A. Gordon, Sales Manager,
General Wheelbarrow Co.,
Cleveland, Ohio



M. L. Pulcher, President, Fed-
eral Motor Truck Co., Detroit,
Mich.



J. D. Abram, President, Abram
Cement Tool Co., Detroit, Mich.



Photograph by Bachrach
J. Henry Warren, Pres., War-
ren-Knight Co., Philadelphia,
Pa.



C. E. Raquet, Sales Mgr., De-
troit Steel Products Co., De-
troit, Mich.



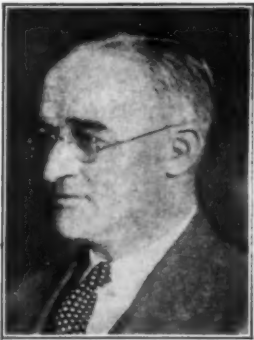
George H. Hall, Sec. & Gen.
Sales Mgr., The Cleveland Rock
Drill Co., Cleveland, Ohio



Photo by The Phillips Studio
G. R. March, New York, N. Y.



A. M. Shenk, Los Angeles, Calif.



H. R. Williams, Sales Mgr.,
Contractors Equipment Div.,
Ohio Locomotive Crane Co.,
Bucyrus, Ohio



Wallace B. Conant, Pres. &
Treas., Conant Machine & Steel
Co., West Concord, Mass.

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A Section of
CONTRACTORS
AND
ENGINEERS MONTHLY

Devoted to
News of Consultants
in the
Civil Engineering Field

The Consulting Engineer

January, 1932

New York

Vol. V, No. 1

Aerial Photography in Topographic Mapping

THE use of aerial photographs in the preparation of topographic maps is proving to be a very economical and rapid method of gathering this information, according to a recent report from W. N. BROWN, INC., Engineers, 1800 E St., N. W., Washington, D. C., who are engaged in this type of work. This firm has just completed mapping an area of 5,578 acres along Fall Creek, Ind., at a scale of 1 inch to 400 feet with $2\frac{1}{2}$ and 5-foot contours, for the Indianapolis Water Co., Indianapolis, Ind. A base map was compiled from aerial photographs showing all the physical features in correct horizontal position, on the plane table field boards. The contours were located by the

Office of

W. N. Brown, Inc.,

Washington, D. C.

usual plane table stadia method. The horizontal control originated and closed on the U. S. Coast and Geodetic Survey triangulation and the vertical control was tied into a U. S. Coast and Geodetic Survey primary

(Continued on page 117)



Scale : 1 inch-1,218 feet



Scale : 1 inch-1,000 feet

ILLUSTRATING THE VALUE OF AERIAL PHOTOGRAPHS IN PLANE TABLE TOPOGRAPHIC MAPPING

The photograph shown on the left supplied the physical data such as the roads, fence lines and houses. The contour location and elevations were determined instrumentally by plane table. The photograph also gave the topographer the position and shape of the drainage lines with detail, proving of material assistance in shaping and drawing the contours, shown in the completed topographic map at the right.

The Consulting Engineer

A Section of
**Contractors
and
Engineers Monthly**

470 Fourth Avenue, New York

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GEORGE S. CONOVER, Manager

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Montgomery & Ward, Wichita Falls, Texas, are at present working on plans for storm sewers and street paving for Taft, a water works system for Muenster, Texas, and plans for a State Aid paving project for Spearman, Texas. They have recently been called as expert witnesses in suits involving the disposal plant at Bowie, Texas, the disposal plant at Olney, Texas, and a suit on the incorporation at Fredericksburg, Texas. Under their supervision the following construction is going on: a power and light and a water works system at Yoakum, Texas, and street paving at Spearman, Texas. In August the contract was let for a sewage disposal plant and extensions to the sewerage system at Mineola, Texas, and this work is now under construction.

C. N. Harrub Engineering Co., 705 American National Bank Bldg., Nashville, Tenn., report that they are at present working on the construction of water works at Adairville, Ky., sewers at Gallatin, Tenn., and recently made a report on a sewage disposal project at Fayetteville, Tenn. Under their supervision a water works system has just been completed at Walton, Ky., the water filtration plant at Clarksville, Tenn., has been rehabilitated and a sewage disposal plant at Winchester, Ky., the contract for which has recently been awarded, is being constructed.

Consulting Briefs

V. V. Long & Co., Oklahoma City, Okla., and Nashville, Tenn., report that they are at present preparing plans for a power plant at Hominy, Okla., at an approximate cost of \$150,000 and a water works and power plant at Pryor, Okla., at an approximate cost of \$100,000. Recently they were called as expert witnesses for Okemah, Okla., in the North Canadian River pollution case, in regard to Robinson Avenue paving for Oklahoma City, Okla., and the Wetumka, Okla., river pollution case.



Watton Studio, Oklahoma City, Okla.

V. V. Long

Wilbur Watson and Associates, 4614 Prospect Ave., Cleveland, Ohio, are at present working on plans for the Main Avenue Bridge at Cleveland and for a Post Office at Findlay, Ohio. Under their supervision the Lorain Central Bridge is being completed.

Koch & Fowler, 801 Central Bank Building, Dallas, Texas, have recently added Harry J. Collins as Engineer-Inspector to its staff and George Hyde and Frank Martine as student engineers. Under the company's supervision the Dallas County Preston Road fresh water supply distribution system with 18 miles of cast iron mains is being laid, as well as grading, paving and landscape work on the Hillcrest Memorial Park Cemetery. A paper "Waterworks Evaluation and Factors Determining Water Rates" is now in preparation which is to be presented this month at the Short Course Waterworks School, at Mineral Wells, Texas.

Burns & McDonnell Engineering Co., 496 Interstate Bldg., Kansas City, Mo., report that they have completed plans and are now working on a municipal diesel engine power plant for Ford City, Penna., and are preparing plans for such a plant for Mount Sterling, Ky., a municipal power plant and system for Piqua, Ohio, plans for a new water supply at Delaware, Ohio, and appraisals of water, gas and electric properties at El Paso, Texas, Dixon, Ill., Rockford, Ill., Mexico, Mo., McPherson, Kansas, and Deer Lodge, Mont. They are also working on plans for a gas system for Rochester, Minn., El Dorado, Kans., and the design for water works improvements for Williston, N. D., Livingston, Mont., and Kalamazoo, Mich. Under their supervision a municipal power plant addition estimated at \$1,250,000 is being built in Kansas City, Kansas, and a large lake for a \$2,500,000 additional water supply for Springfield, Ill.

Consoer, Older & Quinlan, 205 W. Wacker Drive, Chicago, Ill., report that they have recently added Edward Tullberg to their staff. They are now working on plans for a swimming pool for the Park Board of Niles Center, Ill., sewage disposal plants at East Chicago, Ind., and Lansing, Ill., a water softening plant at Neenah, Wis., water filtration for Hammond, Ind., sewers at Peoria, Ill., Owensboro, Ky., and Davenport, Iowa, city plans for Belleville, Ill., and Bettendorf, Iowa, and paving at Niles Center, Ill., and Owensboro, Ky. Under their supervision sewage disposal plants are being built at Huron, So. Dakota, and Sparta, Ill., sewers at Owensboro, Ky., a water filtration plant at Charleston, Ill., and paving at Miles City, Mont., Niles Center, Ill., and Owensboro, Ky.

Boston Engineers Active in Water Works Projects

ACCORDING to a recent report, WESTON & SAMPSON, 14 Beacon St., Boston, Mass., are making an unusually large number of water supply studies, including an investigation of the quality and purification of the water for the Philadelphia Suburban Water Co., a special study for the Newark Water Department, a study of water supply and sewerage for Andover, Mass., a study of sewage disposal for New Hampshire State College, studies of corrosion for the City of Newton, Mass., a study of waste treatment for a bleachery in Rhode Island, and a study of the water supply for the Norfolk County, Mass., Hospital, and for Farmington, N. H. They are also preparing plans for a deferrization plant for a large estate and a booster station for South Orange, N. J. Under their supervision reservoirs are being built for Keene and Wilton, N. H., a pumping station and wells for Reading, Mass., water works extensions for Hanover, N. H., and Westerly, R. I., a tower tank for Westerly, R. I., a water softening unit for South Orange, N. J., and sewage treatment plants for two large schools. In addition they have an unusually large amount of limnological and supervisory work. During this past season they have added to their staff four engineers and one chemist. A paper, "The Beginnings of Water Purification," was presented before the New England Water Works Association, October 1, 1931, by Robert Spurr Weston.

Activities of New York Consulting Engineer

A REPORT from the consulting engineering offices of HENRY W. TAYLOR, 11 Park Place, New York City, indicates that a busy season is in swing with many interesting projects on hand. The new trunk sewer extension and disposal plant for Saranac Lake, N. Y., were completed and in operation in December, and the intercepting sewers, pumping station and sewage disposal plant for the City of Rome, N. Y., were completed and the project placed in operation on November 9. The new water system for the Village of Maybrook, N. Y., is now in full automatic operation.

Mr. Taylor has recently been retained as consulting engineer for improvements to the sewage disposal plant at Lake Placid, N. Y. This work will be done by the Village Sewer Department, and consists of revising the construction of two septic tanks, the installation of chlorination, improvement of the sludge disposal area and the extension of the effluent sewer. The office of Mr. Taylor has been working for the last six months on a pumped hydro project for peak load and standby service. Water pumped to elevated storage will be utilized for the generation of power during peak loads, and will also be available for standby service in case of the failure of one of the large generators in the power system.

Mylchreest & Reynolds, 238 Palm St., Hartford, Conn., are supervising the construction of a brick and steel garage for Roger Sherman Transfer Co. and an addition to the plant of Arrow Hart & Hegeman Electric Co., Hartford, Conn.

Pamphlet of Interest to Engineers

A TREATISE dealing with such mathematical problems as the subject of approximating the areas of inclosures and the subject of interpolation has been written by BENJAMIN F. GROAT, Brookline, Mass. In his pamphlet Mr. Groat endeavors to simplify any such problems by special rules and formulae of an algebraic nature. The paper is entitled "The Mean Value of the Ordinate of the Locus of the Rational Integral Algebraic Function of Degree n Expressed as a Weighted Mean of $n + 1$ Ordinates and the Resulting Rules of Quadrature" and was published in *The American Mathematical Monthly* for April, 1931.

The paper and *Transactions*, Am. Soc. C.E., Vol. 95 (1931), pp. 830-832, 859, give formulae for use with current meters and in general mensuration. That Tchebycheff's forms for even numbers of ordinates do not agree with Groat's corresponding, is due to the fact that in such cases the Tchebycheff forms are not for true arithmetic means, but for weighted means with one weightless ordinate and the rest equally weighted, thus losing the additional accuracy available with an additional ordinate. Groat's formula (9) is general, all resulting forms given were carefully checked except that for 6 ordinates which will be corrected if wrong. The closure to the paper on "Theory of Similarity and Models" is hoped by the author to constitute in itself an important contribution to engineering design, operation, and construction, and appeared in the August, 1931, *Proceedings*, Am. Soc. C. E.

Aerial Photography in Topographic Mapping

(Continued from page 115)

level bench mark. This map is to be used in determining storage capacity for a water supply reservoir, and in determining the areas that will be flooded by the back water from a dam, the construction of which is now being contemplated.

At the present time this company is engaged in the preparation of a map of the area immediately surrounding Louisville, Ky., for use by the Louisville City Planning Commission in developing and controlling the area adjacent to the city. This map is being made by enlarging the U. S. Geological Survey sheets of that area to 1,000 feet to the inch and revising the map for road changes and additions by the use of aerial photographs.



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MANY WISE CONTRACTORSit a practice to check over
pages 142 and 144 each month.

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

Surety's Liability for Rent Due on Equipment

DOES a bond of a contractor or subcontractor to pay for labor or materials used in performing his contract cover rentals on equipment hired by him?

Having made a survey of many court decisions on this subject, the writer finds that he must follow the example of the colored minister, who whenever cornered by a question from the congregation would say, "Dat am a question dat can be answered 'yes,' and it can be answered 'no.'"

In other words, the above stated question can not be given a hard and fast answer applicable throughout the country. Much depends, of course, upon the precise language of the particular bond or the statute under which the bond is given. But more depends upon the attitude of the different appellate courts as to whether the wording of a bond or statute should be given a rigid or elastic interpretation.

In a case decided by the Utah Supreme Court December 4, 1930 (*J. F. Tolton Investment Co. v. Maryland Casualty Co.*, 293 Pac. 611) a road contractor's bond bound him to "pay every person furnishing material or performing labor." The court said that this bond covered \$74.25 rental due on an engine used on the job. The closing paragraph of the opinion reads:

"As in the case of most of the other items in dispute, there is a conflict in the decisions as to whether a charge of this kind is within the contractor's bond. There are many cases upon the subject which are collected in an annotation found in 44 A. L. R. 381. . . . Under the liberal rule of interpretation to which we are committed, we conclude that the charge in question is within the obligation of the bond."

The South Dakota Supreme Court took a similar view of the question in deciding (December 31, 1929) the case of *Western Material Co. v. Enke*, 228 N. W. 385. The court decided that "the value of the use of equipment hired is a proper charge against the bond," but that "certainly the purchase price of substantial items of general plant equipment are not."

The opinion of the Minnesota Supreme Court in *Miller v. American Bonding Co.*, 158 N. W. 432, shows that the Minnesota statutes had been so amended as to expressly require public contractors to give bond for the benefit of "all persons doing work or furnishing skill, tools, machinery, or materials," etc.

The California courts recognize that rental claims are covered by road contractors' bonds. Said the Supreme Court of that state in *Bricker v. Rollins*, 173 Pac. 592:

"In the case of the rental of animals or of machinery applying motive power to the performance of the work to be done under the contract, it is the energy of the instrumentality for which the price is paid, and that energy, whether in vital or mechanical or fluid form, is the thing which is supplied for and used in the work. . . . The foregoing reasoning applies also to the rental of tools, the use of which contributed to the performance of the work. It was the use of the tool, and not the tool itself which formed the basis for the claim of recompense."

Other states in which similar conclusions have been reached

are Kansas (157 Pac. 449), Oregon (170 Pac. 525), Washington (122 Pac. 337).

The point, so far as concerns federal statutory bonds, has been set at rest by a decision of the highest court of the land. (*Illinois Surety Co. v. John Davis Co.*, 244 U. S. 376.) Said the United States Supreme Court:

"The specific objection made to the claim of the United States Equipment Co., for rental of cars, track and equipment used at the Naval Training Station, and the expense of loading the plant and freight thereon to and from the station, is also unfounded. The Surety Company contends that this is not supplying 'labor and materials.' The equipment was used in the prosecution of the work. Material was thus supplied, although a loan serving the purpose, no purchase of it was made."

In passing, it is to be noted that decisions of the United States Supreme Court do not overrule the decisions of state courts on matters of purely state concern. That is why the highest court of each state has the last say as to what the statutes of that state mean.

It is interesting to note that all of the states above referred to lie west of the Mississippi, and that the courts on the east side of the Father of the Waters join some of the Western states in reaching an opposite conclusion, although geography has nothing to do with the subject at all.

In *Cramer v. Board of Chosen Freeholders*, 147 Atl. 639, the New Jersey Supreme Court of Errors and Appeals ruled that rental of trucks by a road contractor was not covered by a bond, citing a previous New Jersey decision that furnishing trucks does not give a claim for "labor".

In *Royal Indemnity Co. v. Day & Maddock Co.*, 150 N. E. 426, the Ohio Supreme Court declared that a public building contractor's bond to pay for labor and materials furnished to him did not cover rental of a concrete mixer, hoisting engine, etc. The court said: "We see no distinction between the status of one who leases an appliance to a contractor to facilitate the performance of his contract and one who sells an appliance to the same contractor for the same purpose."

In *State v. Davis*, 24 S. W. 2d, 1047, the Kansas City Court of Appeals held that rental of a tractor, grader, etc., was not covered by a bond to pay for "material used or consumed in road work." The courts of that state have taken the view that the right of a man who works with his team on a road to protection under a bond to pay for labor and material is distinguishable from a case where one merely rents equipment, in that the team is an instrumentality with which the teamster performs his labor. (300 S. W. 833.)

Obviously, a uniform statute explicitly settling the question adopted by all of the states would enable contractors and equipment lessors to better understand where they are "at." As it is they must hire a lawyer every time they cross a state boundary line, and in most instances the lawyer could only predict what the courts of the state might decide were the question presented, for it seems that in a majority of the states the question has not yet been decided by the courts of last resort.

Construction Industry News

National Equipment Corp., Milwaukee, Wis., has announced that W. J. Koehring has succeeded his brother, the late Philip Koehring, as President of the National Equipment Corp., of which he had been vice president since its organization. Mr. Koehring has been identified with the equipment industry since 1906 when he and his brother Philip and Richard Kiel organized the Koehring Machine Co. Until this recent change he was President and Works Manager of the Koehring Division and President of the T. L. Smith Division of the National Equipment Corp. He is a director of the Sterling Motor Truck Co. and of the Mid-City State Bank, Milwaukee.

This company has recently appointed the Syracuse Supply Co., 314 West Fayette St., Syracuse, N. Y. as its exclusive sales and service representatives in central New York.

Wellman Engineering Co., Cleveland, Ohio, has announced the purchase of the clamshell bucket and heavy-duty trailer business of the G. H. Williams Co., Erie, Penna., including the good will, drawings, patterns, inventions, patents, etc. All engineering, manufacture and sale of Williams buckets and trailers will be transferred immediately to the Wellman Engineering Co. plant in Cleveland. These two lines will continue to be marketed under the trade name "Williams." W. C. Swalley, Secretary and General Manager; A. J. Lichtinger, Assistant Manager; C. F. Weiblen, Sales Manager and P. T. Robin, Chief Engineer, of the G. H. Williams Co., will be associated with the Wellman Engineering Co. at Cleveland in the manufacture and sales of this equipment.

Cleaver-Brooks Co., 740 North Plankinton Ave., Milwaukee, has recently been organized to manufacture and market Cleaver tank car heaters, Cleaver boosters and other equipment used for heating all grades of bituminous materials, aggregates and water for central mixing plants, central proportioning plants, and large construction work where winter mixing of concrete is carried on. The officers are J. C. Cleaver, President, and R. E. Brooks, Secretary and Treasurer. Mr. Brooks was formerly Vice President in charge of sales for the National Equipment Corp., Milwaukee, Wis.

The Asphalt Institute, 801 Second Ave., New York, through the Managing Committee of the Pacific Coast Division, has announced the appointment of Daniel B. Miller as Managing Engineer. Western offices for The Asphalt Institute have been opened by Mr. Miller at 206 Sansome St., San Francisco. Mr. Miller was formerly Chief Engineer of Maintenance for the Wyoming State Highway Department. New Pacific Coast members of The Asphalt Institute are the Standard Oil Co. of California, Union Oil Co. of California, Shell Oil Co., Associated Oil Co., and Gilmore Oil Co., Ltd.

Construction Machinery Co., Waterloo, Iowa has taken over the sales and distribution of truck mixers manufactured by Portland Concrete Machines Co. of Cleveland, a subsidiary of Industrial Brownhoist Corp. Truck mixers will continue to be manufactured in Cleveland under the supervision of C. B. Dutton, President, Portland Concrete Machines Co. Sales and distribution will be under the direction of A. D. Mosby, Vice President, Construction Machinery Co.

Continental Motors Corp., Detroit, Mich., has announced the appointment of Ray Long as Assistant General Sales Manager. Mr. Long joined Continental in 1925, having previously been associated with Federal Motor Truck Co., Chalmers Motor Car Co., Saxon Motor Car, and Columbia Motor Car Co. Mr. Long will be assistant to L. J. Kanitz, General Sales Manager.

Caterpillar Tractor Co., Peoria, Ill., has given the name Special Sales Division to the group of sales engineers who are contacting the larger buyers, similar to the work of the "fleet sales division" of the larger automotive manufacturers. W. J. Dukes is Manager of Engine Sales. G. A. W. Bell, Jr., C. D. Turley, J. H. Howell, Manager of Sales to Public Utilities, and Harold G. Tufty complete the staff working under Walter H. Gardner.

Anderson-Prichard Oil Corp., Oklahoma City, Okla., through its Asphalt and Road Oil Division has announced that A. R. Losh, until recently City Manager of Oklahoma City, has become the Manager of the Asphalt and Road Oil Division. Mr. Losh has served as Assistant State Highway Engineer of Kansas, Assistant Construction Engineer of Forest Roads and District Engineer for the United States Bureau of Public Roads. He was also State Highway Engineer of Oklahoma for two years in which time he introduced the oil road into the Oklahoma highway system.

Lincoln Electric Co., Cleveland, Ohio, has announced the appointment of R. D. Eaglesfield as District Manager in charge of motor and welder sales with headquarters at 314 East 16th St., Indianapolis, Ind.

Materials Handling Institute Organized

SEVENTY representatives of materials handling equipment manufacturers met in Cleveland, December 8, and organized a Materials Handling Institute. The object of this Association is primarily educational to promote a more intense mechanical handling consciousness. The officers are F. E. Moore, Mathews Conveyor Co., President; J. B. Webb, J. B. Webb Co., Vice President; H. W. Standert, Northern Engineering Works, Treasurer; J. A. Cronin, Materials Handling & Distribution, Secretary. A Board of Governors was elected with one representative from each of the following groups of manufacturers: Hoist & Crane, Continuous Conveyors, Floor Trucks & Castors, Industrial Trucks & Tractors, Crawler Cranes, Accessories, Gravity Conveyors, Portable Conveyors, Lift Trucks and Skids, Transmission and Monorail.

Long Haul from Gravel Pit to Paver

(Continued from page 72)

sections 8 feet wide and taken down and hauled on a truck when moved.

PERSONNEL

This 20.9-mile paving job in Wisconsin running from Sheboygan Falls on the north through Waldo, where there was one mile of road already paved and omitted from this contract, through to the south county line of Sheboygan County was completed by the Morris Martin Co., of Berlin, Wis. Morris Martin, President, was in direct charge of the work with Harvey Vieth as Superintendent and Adam Markofski as Foreman. For the Wisconsin Highway Commission, A. L. Hambrecht, Construction Engineer, the work was in the immediate charge of George Langley, County Engineer.

EDITOR'S NOTE.—The sand and gravel plant as seen from the edge of the gravel pit is shown on the front cover of this issue.

Distributors' Bulletin Board

The distributors of construction equipment listed below have made changes this month in their cards appearing in the Distributors' Directory on pages 147 to 171 of this issue of CONTRACTORS AND ENGINEERS MONTHLY:

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 A. E. Hudson Co., Peoria, Ill.
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 H. P. Kelly Equipment Co., Cincinnati, O.
 Kern-Limerick, Inc., Little Rock, Ark.
 Kipp-Kelly, Ltd., Winnipeg, Manitoba
 W. A. Kuhlman & Co., Toledo, O.
 Lakewood Equipment Co., St. Louis, Mo.
 Lange Tractor & Equipment Co., Duluth, Minn.
 Lawrence-Goodling Co., Inc., Mobile, Ala.
 C. A. Lippincott & Bros., Inc., Moorestown, N. J.
 Llewellyn Machinery Corp., Miami, Fla.
 Loggers & Contractors Machinery Co., Portland, Ore.
 John C. Louis Co., Baltimore, Md.
 Joe Lyons Machinery Co., Little Rock, Ark.

McLaughlin Mill Supply Co., Inc., Hammond, Ind.
 McNeilly Machinery Co., Columbus, O.
 The Mechanical Supplies Co., Cincinnati, O.
 Mexico Arizona Trading Co., S. A., Nogales, Sonora
 The Henry H. Meyer Co., Baltimore, Md.
 Midwest Tractor & Equipment Co., Chicago, Ill.
 Miller Equipment Co., Inc., Syracuse, N. Y.
 Miller-Sanford Tractor Co., Eugene, Ore.
 W. A. Nelson Equipment Co., Milwaukee, Wis.
 Ohio Valley Machinery Co., Marietta, O.
 The Albert Olson Co., Ltd., Regina, Canada
 Owen Bucket Co., Ltd., Oakland, Calif.
 Pacific Hoist & Derrick Co., Seattle, Wash.
 The W. M. Pattison Supply Co., Cleveland O.
 P. I. Perkins Co., Boston, Mass.
 The Pope Equipment Co., Cleveland, O.
 Poughkeepsie Farm Service, Inc., Poughkeepsie, N. Y.
 Power Equipment & Service, Inc., New Haven, Conn.
 Howard W. Read Corp., Philadelphia, Pa.
 Richmond Machinery & Equipment Co., Richmond, Va.
 Thorman W. Rosholt Co., Minneapolis, Minn.
 Sid Schultze, Louisville, Ky.
 Shearer & Mayer, Indianapolis, Ind.
 Shepherd Tractor & Equipment Co., Los Angeles, Calif.
 The Geo. F. Smith Co., St. Louis, Mo.
 Smith-Courtney Co., Richmond, Va.
 Southern States Equipment Co., Inc., New Orleans, La.
 Herbert N. Steinbarger Co., Denver, Colo.
 G. M. Stull Co., Chester, Pa.
 The Swords Co., Rockford, Ill.
 Standard Road Equipment Co., Inc., Rockford, Ill.
 Superior Construction Equipment Co., Chicago, Ill.
 Syracuse Supply Co., Syracuse, N. Y.
 John R. Tinklepaugh, Livingston, N. Y.
 The Tractor & Equipment Co., Chicago, Ill.
 Tractor & Machinery Co., Inc., Atlanta, Ga.
 H. B. Trevor Co., Inc., Buffalo, N. Y.
 Joe C. Tucker, Morganfield, Ky.
 Tulley Equipment Co., Inc., St. Louis, Mo.
 Virginia Road Machinery Co., Inc., Richmond, Va.
 Francis Wagner Co., El Paso, Texas
 J. H. Welch Co., Inc., Buffalo, N. Y.
 Western Material Co., Sioux Falls, S. D.
 The Wheeler Equipment Co., Buffalo, N. Y.
 Willard Equipment, Ltd., Vancouver, B. C.
 The W. W. Williams Co., Columbus, O.
 Wilson-Weesner-Wilkinson Co., Nashville, Tenn.
 Wm. H. Ziegler Co., Inc., Minneapolis, Minn.

A New Type of Corrugated Metal Pipe

A NEW type of culvert known as Multi-Plate pipe, a super-corrugated metal pipe with a 5-gage invert and 8-gage plate on the remainder of the circumference, has recently been developed by the Armco Culvert Manufacturers Association, Middletown, Ohio. The first installation was made under a railroad near Jackson, Miss., and the pipe in this case was 90 inches in diameter and 125 feet in length. It was installed by the Drainage Engineering Co., to replace an arch bridge that had failed. The pipe, which is made in sections, was shipped to the job and assembled in the field. Each section of this 90-inch installation was made up of six plates.

Multi-Plate pipe is similar in appearance to the usual corrugated metal pipe except that it is made of heavy plates strengthened with larger corrugations and is so designed that it is erected in the field by bolting the plates together instead of being manufactured by the usual shop fabrication methods. The ingot iron plates have corrugations 6 inches from crest to crest and 1½ inches deep. The plates are match-punched, formed or curved to the desired shape and then galvanized before shipment. The plates are shipped nested, and in the field four, five, six, seven, or eight plates are bolted together to form 60, 75, 90, 105 or 120-inch diameter pipe, respectively. The gage of the plates may vary according to the diameter.

In bolting the plates together the circumferential joints are broken by staggering the plates so that continuous pipe in any multiple of 5 feet can be made without a circumferential seam. All the plates are 10 feet long except the end sections which are 5 feet long.

Road Show Notes

Aeroil Burner Co., Inc., West New York, N. J., will exhibit in Space 419 the new Aeroil power spray machine for penetration work or surface treatment as well as other Aeroil equipment including a concrete curing asphalt spray outfit, oil burners for road oil distributors, asphalt kettles, maintenance heaters, pouring pots, concrete heaters, thawing torches, water heaters and weed burners. George P. Kittel, President, will be in charge, assisted by R. S. Arthur, Chicago Branch Manager.

American Fork & Hoe Co., Cleveland, Ohio will have on exhibition in Space 420 its line of hand shovels for general road work. H. C. Branahl, Sales Manager, and C. B. Myers will be in attendance.

Anthony Co., Inc., Streator, Ill., will show many new features and improvements in Anthony hydraulic hoists and bodies. The shaker or muck remover, which is incorporated in all Anthony pipeless hydraulic hoists, will be exhibited and demonstrated. In addition there will be shown a new slant-type pipeless hydraulic hoist for 1 and 1½-ton chassis, the new heavy-duty pipeless hydraulic hoist for 2, 2½, 3 and 3½-ton trucks and a cam-type pipeless hydraulic hoist for 1½-ton trucks. The exhibit will be located in Space 246 and those in attendance will be W. C. Anthony, President; R. R. Howard, Vice Pres. and Sales Mgr.; J. H. Monning, C. H. Worrells, E. L. Flannigan and C. H. Montelius.

Armco Culvert Manufacturers Association, Middletown, Ohio, will exhibit in Space 201 Multi-Plate pipe, the most recent development in drainage structures, Armco metal cribbing and Armco paved invert pipe. The following representatives of the Association will be in attendance: S. R. Ives, Vice Pres. and Gen. Mgr.; George E. Shafer, Engr. of Tests; M. C. Noble and Eugene Keller, Regional Mgrs.; W. H. Spindler and R. E. Pearson, Publicity Division.

The Asphalt Institute, New York City, will show the new stability testing machine as well as moving pictures of the various processes in the use of asphalt. J. E. Pennybacker, Managing Director; B. E. Gray, Highway Engr.; Prevost Hubbard, Chemical Engr.; and F. C. Field, Chemist, will be in attendance.

Atlas Scraper Co., Bell, Calif., will have a small booth with J. Willis Turner, Sales Mgr., in attendance. It is the intention of the company not to have its product on exhibition at the booth but to have the new Atlas power scraper demonstrated in the Airport during the Show.

Barber-Greene Co., Aurora, Ill., will feature its new bituminous paver and finisher. In addition to this paver, which will be seen outside the exhibit hall near the entrance, this company will have space in Booth 134 where there will be moving pictures of B-G pavers, showing them on various jobs. Members of the organization who will attend are H. H. Barber, Pres.; W. B. Greene, Vice Pres.; F. D. Hooper, Sales Mgr.; C. B. Gould, Detroit District Mgr.; and Jack Turner, Publicity Mgr.

The Barrett Co., New York City, will illustrate and demonstrate by diagrams, models, photographs and moving pictures the latest and most modern methods in the use of

Tarvia. Actual samples of existing Tarvia roads will be a part of the exhibit. As in former years, the central feature of the exhibit will be the Barrett Tarvia distributor with its load of sweet cider which will be served to all visitors. The space assigned to this company is No. 115 and those in attendance will be O. A. Brand, Mgr.; Paul Macy, Asst. Mgr.; and George E. Martin, Consulting Engr., all of the General Tarvia Dept.

Bay City Shovels, Inc., Bay City, Mich., will exhibit in Space 132 a ¾-yard full-revolving Bay City shovel.

Beach Manufacturing Co., Charlotte, Mich., will feature at its exhibit the Beach Combine, a quadruple-blade road maintainer and snow plow. F. H. Beach, F. O. Redick and R. J. Hill will be in attendance.

Bendix-Westinghouse Automotive Air Brake Co., Pittsburgh, Penna., will have on exhibition in Space 456-B an axle with air brake chambers, a display rack showing an air brake installation, and sectioned parts. Those present will be D. H. Robinson, Production Service Mgr.; R. M. Heinrichs, Gen. Mgr.; Fred L. Hall, Service Mgr.; R. H. Casler, Field Engr.; and Major Sharp, A. E. Young and G. Sarver, Reps.

Black & Decker Manufacturing Co., Towson, Md., will show its new Turtle-back Drive-On Loadometer and test Loadometer as well as a line of portable electric tools for truck and road building machinery maintenance. This booth will occupy Space 401, with E. E. Powell, H. L. Prince and F. J. Troll in attendance.

Blaw-Knox Co., Pittsburgh, Penna., will occupy Space 119 and will have on display an improved Ord 9 to 10-foot adjustable finisher equipped with double screed and tamper and a 4-cylinder motor, an aggregate weighing batcher, a cement weighing batcher, road, street and sidewalk forms in a complete range of types and sizes, clamshell buckets, an Ateco hydraulic scraper and a large number of photographs showing the complete Blaw-Knox line of batcher plants, bulk cement plants, Trukmixers, agitator truck bodies, ready-mixed concrete plants, asphalt finishers, truck turntables, Cementtanks, wagon graders, dragline buckets, tamping rollers, scarifiers and bulldozers.

Bragg-Kliesrath Corp., South Bend, Ind., will feature in its exhibit two Timken axles with B-K power brake units. W. E. Babler will be in charge of the exhibit, which will be located in Space 456-C, with Messrs. Vogelsong and Harvey also present.

Broderick & Bascom Rope Co., St. Louis, Mo., will have on exhibition its line of wire rope of both regular construction and the Flex-Set pre-formed construction. Fred Zimmerman, Sales Mgr., will be in charge with Hector Neuhoff, Salesman, also in attendance.

Buda Co., Harvey, Ill., will exhibit in Space 253 a Buda-M.A.N. 90-horsepower industrial diesel engine, a Model H-298 6-cylinder power unit, a Model JH-4 87-horsepower shovel engine and a Buda Hivelo Model K-393 7-bearing engine which will be shown for the first time. R. K. Mangan, Sales Mgr., Industrial Div., will be in charge of the exhibit with H. M. Sloan, Vice Pres. and Gen. Sales Mgr.; C. C. Hinkley, Executive Engr.; Walter Parrish, Chief Engr.; A. F. Ochtman, L. F. Shoemaker and J. C. Baseheart, Sales Engrs., also present.

Buffalo-Springfield Roller Co., Springfield, Ohio will exhibit in Space 126 a 2½-ton gas tandem roller, a 10-ton gas tandem, a 5-ton 3-wheel roller with scarifier, an 8-ton



The Berg Heavy-Duty Surfacer

3-wheel roller with scarifier, blade and half cab and a 10 to 11-ton Model VM33 3-wheel roller with scarifier. Those in attendance will be C. J. Foster, Vice Pres.; J. F. Richardson, Secy. and Sales Mgr.; E. E. Greiner, Treas.; A. W. Aitken, Chief Engr.; P. S. Foster, Adv. Mgr.; W. J. Hazeltine, Sales Engr.; E. C. Touhey, Mgr., New York Office; G. P. White, Mgr., Philadelphia Office; L. F. Bryant, Mgr., Cambridge Office; A. Peck, Mgr., Buffalo Office; and W. H. McClenen and Wilber Heathman, Reps.

Butler Bin Co., Waukesha, Wis., will exhibit a small working model of a 3-compartment steel storage bin equipped with a weighing hopper with a three-beam scale, an automatic bulk cement weighing hopper, the latest type aggregate weighing hopper, bin gates and other accessories. M. R. Butler, A. R. Morton and H. W. Butler will be in attendance.

The Philip Carey Co., Cincinnati, Ohio will occupy Space 106 where Elastite expansion joint, asphalt plank, rail filler and subgrade felt will be on exhibition. The company will be represented by a number of sales department heads, engineers and salesmen with C. V. R. Fullenwider, Mgr., Elastite Products Division, in charge.

J. I. Case Co., Racine, Wis., will exhibit Models LI, CI and CD tractors and Models LE and CE engines. The booth will be located in Space 111 with George W. Iverson, Sales Mgr., Industrial Div., in charge.

Centaur Tractor Corp., Greenwich, Ohio, will have on exhibition a Centaur highway mower in Space 445. C. C. Stedman, Vice Pres.; C. K. Watson, Asst. Sales Mgr.; and C. B. Hall, Salesman, will be in attendance.

Colas Roads, Inc., Boston, Mass., will exhibit in Space 423 its line of asphalt emulsions. Those in attendance will



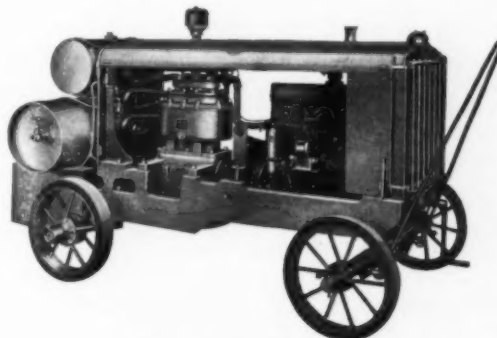
Applying Colas in Road Construction

be J. S. Sawyer, Gen. Mgr.; G. N. Hoffman, and V. L. Ostrander, New York; L. M. Stanhope, Pennsylvania; F. J. Murray, Chicago; and J. Gordon Muir, Ohio, Sales Engrs.

Colprovia Roads, Inc., New York City, will have an exhibition consisting of motion pictures, photographs and descriptive matter demonstrating the progress and latest developments in road construction which have been made by this company. Edmund Johnstone, Pres.; F. C. Armstrong, Vice Pres., and J. A. Dow will be present.

Concrete Surfacing Machinery Co., Cincinnati, Ohio, will exhibit a full line of Berg surfacers. The booth will occupy Space 101 and M. Wetstein, A. Dreifus, M. Wolfson and F. E. Aurand will be in attendance.

Curtis Pneumatic Machinery Co., St. Louis, Mo., will occupy Space 241 where a full line of Curtis portable compressors will be on exhibition. Richard Stone and I. B. Lewis will be in attendance.



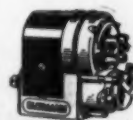
A Curtis Portable Compressor

D-A Lubricant Co., Inc., Indianapolis, Ind., will exhibit in Space 204 drums of D-A lubricant. Frank L. Binford, Pres.; Louis C. Slicer, Secy.; and J. D. Hughes, Jr., Sales Rep., will be in attendance.

Dodge Brothers Corp., Detroit, Mich., who will have one of the largest exhibits at the Road Show, will have on display a full line of trucks and equipment of interest to road builders, contractors, motor freight haulers, state, county and city highway and street maintenance officials. The exhibit will be located in Space 311 with Allison Miller, George A. Orphal and Herman Ude in attendance.

Dow Chemical Co., Midland, Mich., will have on display its calcium chloride and demonstrate its use in road construction. Those present at the Dow booth in Space 203 will be Donald Williams, Asst. Sales Mgr., who will be in charge of the exhibit; F. A. Koch, Asst. Mgr., New York Office; H. Knowles, J. R. Anderson, W. C. Curran, G. Hemmerick, H. N. Hood, T. R. Kearney, J. C. Lewin, G. F. Metcalf, Vern Moulton, V. B. Redfern, F. M. Whaley, K. M. Wildes, T. E. Williams and E. N. Knox, Salesmen.

Eisemann Magneto Corp., New York City, will have on exhibition its line of magnetos, couplings and engine governors. Those present will be T. E. Kennedy, Gen. Sales Mgr.; B. B. Woodford, Asst. Sales Mgr.; O. S. Stanley, Chicago Branch Mgr.; and I. W. Edwards, Detroit Branch Mgr.



An Eisemann Magneto

Euclid Road Machinery Co., Euclid, Ohio, will exhibit in Space 249 the Euclid Track-Wheel wagon, the new Euclid



A Euclid Track-Wheel Wagon

track, a bulldozer, wheel scraper, rotary scraper and tamper. Those in attendance will be A. P. Armington, Pres. and Gen. Mgr.; W. G. Fleming, Vice Pres. and Sales Mgr.; S. F. Armington, Secy.; F. C. Dondero, R. A. Trippier, T. H. Taylor and V. D. Roland, District Mgrs.

Fawick Manufacturing Co., Waukesha, Wis., will exhibit in Space 426 its industrial clutches, power take-off units and road roller reversing clutches. Those in attendance will be Thomas L. Fawick, Pres., and C. M. Eason, Sales Mgr.

Federal Motor Truck Co., Detroit, Mich., will exhibit two new models, a 1½-ton 6-cylinder chassis and a high speed heavy-duty 5 to 6-ton chassis and cab, as well as Models E3 and T10DR dump bodies and hoists. The display will be located in Space 304, with W. B. Rayburn, National Sales Mgr.; E. W. Winans, Body Engr.; F. P. Soper, Sales Mgr.; Jack McCarty, O. C. Dunham, Fred T. Wright, M. F. Hart, National Sales Div.; J. M. Dunwoodie and H. T. Swain, District Mgrs., in attendance.

Four Wheel Drive Auto Co., Clintonville, Wis., will exhibit two FWD trucks, the HH6 of 2½-ton which is a new model designed especially as a road building and maintenance unit, and the 1932 6-wheel model of 6-ton capacity. In addition the **Wausau Iron Works** will exhibit a Wausau snow plow mounted on an FWD 7½-ton M7 model. Those present at the FWD booth in Space 211 will be W. A. Olen, Pres. and Gen. Mgr.; R. H. Schmidt, Gen. Sales Mgr.; S. H. Sanford, Asst. Sales Mgr.; W. M. Hanson, Adv. Mgr.; H. M. Daniels, Branch Mgr., New York City and H. G. Engel, District Sales Mgr.

Freuhauf Trailer Co., Detroit, Mich., will have on exhibition in Space 258 a Freuhauf carryall, a Freuhauf Flyer and several types of Freuhauf automaties. George Thomas, District Mgr.; G. W. Chamberlin, Vice Pres. and Director of Sales; E. L. Vosler, Vice Pres.; L. C. Allman, Sales Promotion Mgr.; W. E. Fletcher, Transportation Engr.; and D. H. Ewen, Adv. Mgr., will be in attendance.

Fuller Co., Catasauqua, Penna., will exhibit in Space 130



The Fuller-Kinyon Bulk Cement Unloading Pump

a Fuller-Kinyon portable bulk cement-unloading pump, a Fuller rotary air compressor and a rotary cement bin gate. G. K. Engelhart, P. F. Stauffer, Sales Mgr., and J. M. Alonso, Mgr., Chicago Office, will be present.

Gledhill Road Machinery Co., Galion, Ohio will show the Gledhill road adjuster and the new road grader which will be on display for the first time. This exhibit will be located in Space 212, with E. C. Gledhill, Pres. and Gen. Mgr.; W. V. Goshorn, Secy. and Treas.; and C. G. Porterfield, Chief Engr., in attendance.

Goroco Mechanical Spreader Co., Philadelphia, Penna., will exhibit in Space 403 a Goroco chip spreader. R. E. Eggleston, Pres.; H. N. Beehtel, Sales Mgr.; and A. I. Dean, Supt., will be present.



The Goroco Mechanical Spreader, Shown in Carrying Position on a Truck

Hamilton Manufacturing Co., Two Rivers, Wis., will exhibit in Space 459 Auto-Shift drawing tables and its new filing units and stools. H. G. Schaefer and H. L. De Lisle, Sales Engrs., will be in attendance.

Hauck Manufacturing Co., Brooklyn, N. Y., will show a Hauck fuel oil burning surface heater, an asphalt kettle, the new power cold tar and asphalt emulsion sprayer, besides several smaller pieces of equipment such as portable torches and weed burners. This exhibit will be located in Space 312 with F. John Schwenk, Sales Mgr.; Herbert Vogelsang, Cleveland District Mgr.; and Jules Escherman, Chicago District Mgr., in attendance.

Headley Emulsified Products Co., Philadelphia, Penna., has been assigned to Space 443 where J. G. Campazzie, Edgar S. Ross, F. X. Kern, E. J. Hunt, W. T. Gilbert and P. F. Killy will be in attendance to furnish information on the line of Headley products.

Heltzel Steel Form & Iron Co., Warren, Ohio, will hold its exhibit in Space 123 where J. N. Heltzel, Pres. and Treas.; J. William Heltzel, Vice Pres.; and B. N. Clark, Sales Mgr., will be in attendance.

Hercules Co., Marion, Ohio, will exhibit in Space 120 Hercules rollers and the new Hercules Crawl-Tractor. A feature of the exhibit will be another new development in road building machinery which will be announced at the Road Show. G. V. R. Mulligan, Manager of Sales; M. Kenneth Stolz, Publicity Mgr.; and K. D. Hochstetter,



The Complete Line of Hercules Rollers, Including Models 120, 100, 80 and 60

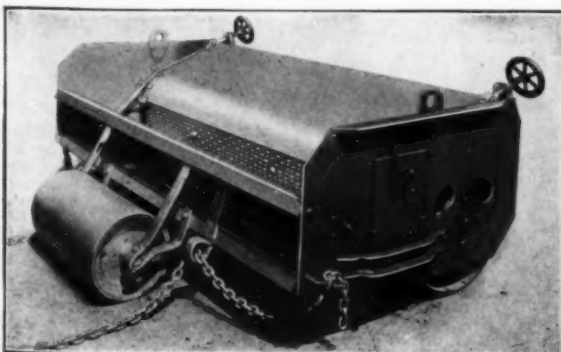
Salesman, will represent the Hercules Co.

Hercules Motors Corp., Canton, Ohio, will have on exhibition in Space 300 a complete display of its entire line of heavy-duty 4 and 6-cylinder engines. The exhibit will feature a large series of heavy-duty 6-cylinder engines known as the HX series, the JX series of small heavy-duty 6-cylinder engines and the IX series of heavy-duty 4-cylinder engines. Both engines and power units will be displayed. In addition there will be on exhibition models of the TX, OO, L and OX series of 4-cylinder heavy-duty engines and power units and the WX and YX series of 6-cylinder engines as well as a complete exhibit of parts.

Hercules Powder Co., Wilmington, Del., will have on exhibition in Space 436 films, pictures and diagrams of fill settlement methods by the use of explosives. L. C. LeBron, Agriculture Engr., and John K. McCabe, Mgr., Contractors Div., will be present.

Hercules Products, Inc., Evansville, Ind., will exhibit in Space 416 an assortment of Hercules all-steel dump bodies and in Space 235 Hercules gas engines. The line of dump bodies will consist of mechanical power, hydraulic power, rotary power, automatic and hand hoist bodies in various styles and capacities. A feature of this exhibit will be the hydraulic power dump bodies in the straight side, coal and coke flared side, removable side and garbage types. The line of gas engines exhibited will include $1\frac{1}{2}$ to 2-horsepower, $2\frac{1}{2}$ to $3\frac{1}{2}$ -horsepower, 6-horsepower and 8-horsepower engines which can be run on either gasoline, kerosene or distillate fuel. Members of the Hercules organization who will attend are G. K. Specht, Vice Pres. in charge of distribution; B. E. Karges, Sales Promotion Mgr.; R. L. Frazier, Service Mgr.; O. H. Olsen, Regional Mgr.; and E. P. Monroe, Mgr., Dump Body Div.

Highway Service, Inc., New Bedford, Mass., will have on exhibition in Space 121 the Handy Rol-Roc mechanical



The Handy Rol-Roc Mechanical Spreader

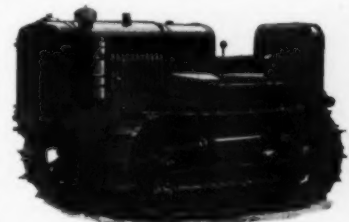
spreader. A. N. Nickerson, Engr., and William G. Ramsden, Salesman, will be in attendance.

Huber Manufacturing Co., Marion, Ohio, will exhibit in Space 129 a 10-ton motor roller, a 5-ton motor roller and a Huber maintainer. This maintainer, which will be displayed for the first time, is powered with a Huber modern industrial power plant, either 4 or 6-cylinder at the purchaser's option. M. E. Miller, Sales Director, will be in charge of the exhibit, assisted by J. H. Cooper, Mgr., Indianapolis Branch, and W. J. Maloney, New York State Sales Rep.

Hug Co., Highland, Ill., will have on exhibition in Space 226 two standard models of Roadbuilders trucks, Models 60 and 82 and in addition will show for the first time the new Hug spring blade agitator body for the transportation of wet concrete, which will be mounted on a Hug 87-K Roadbuilder chassis. There will also be on exhibition standard models of the Hug subgrading machine and subgrade template. R. K. Tibbetts, Vice Pres. and Gen. Mgr., will be in charge of the booth with C. J. Hug, Pres.; V. H. Koch, Secy. and Treas.; H. Gruenfelder, Service Mgr., T. S. Roy and G. V. Aldridge also present.

Chas. Hvass & Co., Inc., New York City, will exhibit a Hvass bituminous distributor mounted on a motor truck, a truck-mounted Junior bituminous distributor, a trailer supply tank, a spreader attachment for large size dump trucks and the Junior spreader attachment for small dump trucks.

International Harvester Co. of America, Chicago, Ill., will exhibit in Space 222 a cut-out truck chassis, a new A7 heavy-duty truck, a cut-out tractor chassis, a new I30 industrial and a Model T20 TracTracTor. T. B. Hales will be in charge of the motor truck exhibit and W. M. Parrish in charge of the industrial wheel and crawler-type tractors.



The New McCormick-Deering TracTracTor

Iowa Manufacturing Co., Cedar Rapids, Iowa, will have on exhibition in Space 227, Section F, a new style 3 x 36-inch heavy-duty reduction crusher and a 14 x 36-inch heavy-duty primary crusher. Howard Hall, Pres.; Kenneth Lindsay, Vice Pres. and Gen. Sales Mgr.; A. C. Gossard, Asst. Sales Mgr.; H. F. Saxton, Eastern Branch Mgr.; B. P. Saxton, Eastern Rep., and J. D. Aldrich, District Sales Mgr., will be in attendance.

Killefer Manufacturing Corp., Los Angeles, Calif., will exhibit a Killefer No. 4 road disc or planer, which will be the feature of the exhibit, a 5-point road roofer, a 9-point power lift scarifier, a 50-cubic foot wheeled scraper for 30-horsepower tractors, a 27-cubic foot revolving scraper for 20-horsepower tractors, a 64-cubic foot model of the same type for 60-horsepower tractors, a No. 10A Killefer road ripper and a No. 25 ditching machine. This exhibit will be located in Space 122 and the following representatives of the company will be present: O. P. Robb, Vice Pres. and Gen. Sales Mgr.; C. C. Wuthrich, Columbus, Ohio; W. L. Franks, Cedar Rapids, Iowa; L. H. Knittel,

Philadelphia, Pa.; H. W. Seharber, Atlanta, Ga.; A. P. Olinger, Wichita, Kans.; and E. F. Carlmark, Los Angeles, Calif., of the Sales Dept.



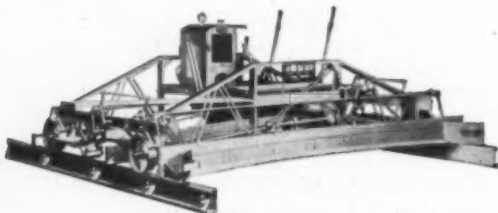
A Kinney Truck-Mounted Asphalt Pressure Distributor

Kinney Manufacturing Co., Boston, Mass., will have on exhibition in Space 128, Section G, one of the latest models of the Kinney truck-mounted Super distributor for applying bituminous materials to roads. A. J. Munday will be in charge of the exhibit with W. E. Worcester, E. F. Bender, Don Neal, Claude Hill and H. G. Saunders also in attendance.

Kohler Co., Kohler, Wis., will feature a special cutaway model showing the construction and operation of Kohler electric plants and their adaptability to all kinds of outdoor construction. A Model EH Kohler which carries its house with it will also be displayed. Bart Downey, Mgr., Detroit Branch, will be in charge of the exhibit.

Koppers Products Co., Pittsburgh, Penna., will have on display in Space 109 educational material on the use of Tarmac. P. L. Griffiths, Vice Pres., and S. H. Scott, Tarmac Dept., will be in attendance.

Lakewood Engineering Co., Columbus, Ohio, will exhibit Lakewood road forms, straight-edges, a graderooter, a steel subgrader, finishing machine and form tamper. The exhibit will be located in Space 220 with Lion Gardiner, Pres., and Ralph Cornelisen, Asst. Gen. Sales Mgr., in attendance.



A Lakewood Type C Finisher

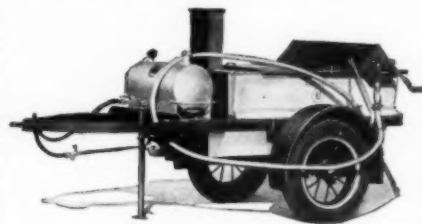
Le Roi Co., Milwaukee, Wis., will have on exhibition in Space 215 models of Le Roi engines. C. W. Pendock, Pres.; J. R. Frantz, Vice Pres.; W. R. Karll, Sales Mgr.; and T. S. Tuttle, Asst. Sales Mgr., will be in attendance.

A. Leschen & Sons Rope Co., St. Louis, Mo., will have on exhibition in Space 309 samples of the various construction in which Hercules Red-Strand wire rope is furnished for use on road building equipment. E. J. Schilling, E. E. Hickok and William Berninger will represent the company.

Libbey Cataphote Corp., Toledo, Ohio, and New York City, will have on exhibition Cataphotes and Cataphote signs and signals. William H. Searight will be in charge, assisted by Burnside R. Value and E. O. Seidenberg.

Linde Air Products Co., New York City, will have on exhibition Oxweld and Prest-O-Weld welding and cutting blowpipes, Linde oxygen, Union carbide, Prest-O-Lite acetylene, Prest-O-Lite flood lights, carbide flood lights, Prest-O-Lite head lights, Prest-O-Lite primer and Haynes Stellite. T. C. Fetherston, R. W. Boggs, F. Langstrom and T. Schwartz will be in attendance in Space 458.

Littleford Bros., Cincinnati, Ohio, will feature an entirely new product which will be announced at the Road Show. In addition there will be the usual display of



The Littleford No. 84-HD Kettle

LB equipment, including asphalt kettles, tool boxes, surface heaters, emulsion sprayers, hand torches and joint fillers. The exhibit in Space 114 will be in charge of L. W. Glaser, Sales Mgr., with Herbert Haupt, and L. L. Bradshaw, Engrs., J. J. Strobel and H. F. Reynolds, Sales Dept., and H. M. Orschel of the Chicago Branch Office also present.

Lufkin Rule Co., Saginaw, Mich., will exhibit in Space 148, Section G, all kinds of measuring tapes for road building and general requirements and a complete line of rules and precision tools. R. M. Benjamin will be in charge.



A Model G-17 Purolator

Motor Improvements, Inc., Newark, N. J., will display the Purolator, an oil filter for lubricating oil, fuel oils and gasoline. The exhibit will be located in Space 410, with Frank P. Herman, N. C. Vosler and H. B. Graham in attendance.

National Carbide Sales Corp., New York City, will exhibit National Carbide VG lights, Handy lights and the carbide lantern as well as its full line of welding and cutting equipment in Space 460. R. C. Holcomb and E. C. Ackerman will be in attendance.

National Paving Brick Association, Washington, D. C., will show moving pictures, literature and models of brick pavement construction. The exhibit will be located in Space 104, Section G, with G. F. Schlesinger, Chief Engr. and Managing Dir.; F. B. Dunn, Asst. to Pres.; Q. A. Campbell, Asst. Chief Engr.; and William C. Perkins, Chief Engr., Eastern Region, in attendance.

Norma-Hoffman Bearings Corp., Stamford, Conn., will exhibit a complete range of sample ball, roller and thrust bearings in Space 234. Representatives of the company who will be present are O. P. Wilson, Vice Pres.; H. J. Ritter, Asst. Secy.; D. E. Batesole, Asst. Engr. Mgr.; T. J. Harley, Chicago Dist. Mgr.; R. E. Hecker, Cleveland Dist. Mgr.; M. B. Hawxhurst, Detroit Rep.; T. E. Rounds and T. M. Kaino, Sales Engrs.

Novo Engine Co., Lansing, Mich., will exhibit in Space 218 Novo engines and hoists. C. E. Bement, Vice Pres. and Gen. Mgr., and S. M. Hunter, Sales Mgr., will be in attendance.

Tinius Olsen Testing Machine Co., Philadelphia, Penna., will have on exhibition an all-metal road surface rater of the Olsen-Andrew type, shown for the first time, an Olsen vertical-type concrete beam tester for indicating the modulus of rupture direct, a Universal testing machine, a ductility testing machine and a direct motor-driven Brinell hardness tester, these last three being shown for the first time, a dual indicating system cement testing machine, cement accessories, an M. I. T. folding endurance paper tester and an Olsen-Lundgren dynamic electric-spark semi-automatic horizontal-cradle type static-dynamic balancing machine. This exhibit will be located in Space 402 with Harry H. Gildner, Bruce L. Lewis, Thomas Richards and C. Robert Tait in attendance.

Page Steel & Wire Co., Pittsburgh, Penna., will exhibit Page highway guard and a new style of guard rail. Those present at the exhibit which will be located in Space 144 will be C. N. Johns, Gen. Mgr.; W. H. Bleecker, Sales Mgr., and S. B. Cairns, Mgr., Highway Guard Div.



A Perfection Hoist and Body

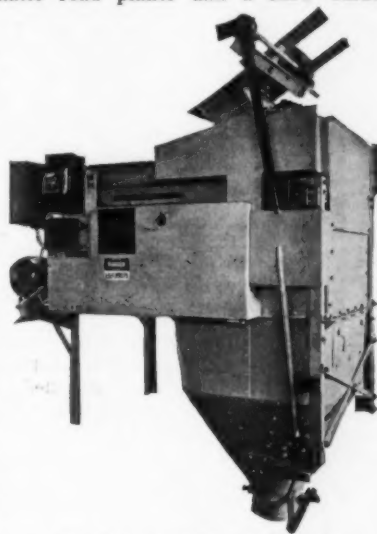
Perfection Steel Body Co., Galion, Ohio, will exhibit a Perfection hydraulic hoist and body and a gravity hoist and body. This booth will occupy Space 444, with H. Cohen, Pres., and Harry Gee in attendance.

Perfex Corp., Milwaukee, Wis., will exhibit in Space 207 heavy-duty and automotive type radiators. Roger Birdsell, Vice Pres. and Sales Mgr., and R. W. Wilson, Sales Engr., will be in attendance.

Pioneer Gravel Equipment Manufacturing Co., Minneapolis, Minn., will display in Space 216 the new 836 Pioneer crusher and a model of a Pioneer crushing plant. Representatives of the company who will be in attendance are: W. H. F. Thompson, Vice Pres.; J. A. Hanratty, Vice Pres.; K. Edward Brunsdale, Treas. and Adv. Mgr.; Melvin Ovestrud, Supt., and C. K. Ordway, Gen. Rep.

Pneu-Hydro Road Machinery Co., Cadillac, Mich., will exhibit in Space 239 a 10-foot pneumatic road planer, an 8 to 9-foot pneumatic road planer and a snow blade attachment for all models of its road planers. H. E. Price, Vice Pres., will be in charge of the exhibit.

Relay Motors Corp., Lima, Ohio, will have on exhibition in Space 313 two new 1932 heavy-duty trucks and one smaller unit. W. E. Murphy, Asst. Sales Mgr., will be in charge, with H. E. Burke, Sales Mgr., and W. J. Baumgartner, Chief Engr., also present.



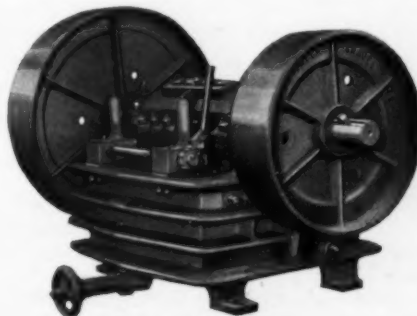
The Richardson Duo-Screw Feed Automatic Scale

Richardson Scale Co., Clifton, N. J. will exhibit in Space 437 a 400 to 1,000-pound Model M-39 Richardson Duo-Screw Feed automatic cement scale of the type used for weighing cement in bulk by road contractors. William F. Cohn, Special Sales Rep., will be in charge of the exhibit, assisted by W. A. Carte and H. E. Matson, of the Chicago office. H. E. Godfrey, Secy. and Treas.; S. G. Murray, Vice Pres. and Chief Engr.; and N. C. Webster, Chicago Branch Mgr., will also be present.



A Side View of the New Warco Octopus Showing the Flexibility of the Unit

W. A. Riddell Co., Bucyrus, Ohio, will show Warco graders, both power and drawn, rear crawlers for tractors and the new Octopus super power oscillating traction unit. This exhibit will be located in Space 214, Section F, and those in attendance will be H. F. Holbrook, Treas. and Gen. Mgr.; N. E. Jersey, Sales Mgr.; C. A. Beal, Asst. Sales Mgr., and W. G. Beebe, Secy. and Adv. Mgr.



A Pioneer Model 836 Crusher



The Shunk Camel Dump Wagon

Rockford Drilling Machine Co., Rockford, Ill., will feature its new over-center or toggle-type clutch for industrial purposes. This clutch can be supplied complete with power take-off units of the plain or geared reduction type. A complete power take-off incorporating a geared reduction and with the Rockford over-center clutch installed will also be exhibited. This booth will occupy Space 434 with E. C. Shields, Vice Pres., in charge of the exhibit. W. F. Hughes, Clutch Engr., will also be present.

Root Spring Scraper Co., Kalamazoo, Mich., will exhibit in Space 229 a double cylinder motor truck maintainer with hydraulic operation and a miniature of a Big Buster V snow plow with hydraulic lift and hydraulically controlled wings. E. A. Weeks, Sales Mgr., and M. J. Root, Secy.-Mgr., will be in attendance.

St. Paul Hydraulic Hoist Co., St. Paul, Minn., will have on exhibition in Space 302 miniature models of the complete line of St. Paul light, medium and heavy-duty units of dump equipment. Those in attendance will be V. L. Farnsworth, Fred Bell, Jr., and Harold H. Miller.

Sauerman Bros., Chicago, Ill., will have on exhibition in Space 135 power-operated models of a Sauerman slack-line cableway excavator and a Crescent drag scraper, a hand-operated model of a crawler crane rigged up with a Crescent scraper bucket, a hand-operated model of an improved type of conveying cableway designed by Sauerman engineers for handling loads of from 1 to 20 tons, and some actual equipment, including a Crescent scraper bucket and several Duro-lite steel dragline blocks ranging in size from 6 to 30 inches in diameter. D. D. Guilfoil, Sales Mgr., will be in charge of the exhibit.



A Sauerman Crescent Scraper Loading Pit-Run Gravel

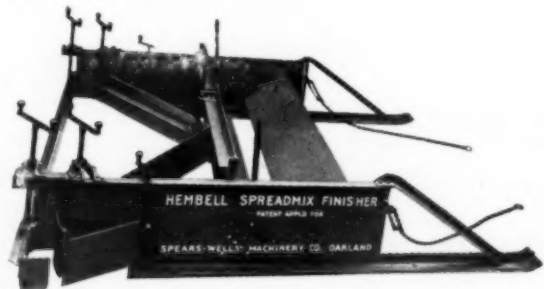
Scintilla Magneto Co., Inc., Sidney, N. Y., will exhibit in Space 456-D a full line of Scintilla magnetos for tractor and industrial use, adapted to a wide range of power plants from single-cylinder auxiliary units to heavy-duty and high speed engines. A line of Scintilla ignition accessories will also be included. D. J. Wilbur will be in charge

of the exhibit with Herman Hanni, Vice Pres. and Gen. Mgr., and other Scintilla sales and service representatives in attendance.

Shunk Manufacturing Co., Bucyrus, Ohio, will have on exhibition in Space 238 a Camel tractor dump wagon, Meyer auto snow plows, road grader blades, Shunk metal traffic lane markers and Bradley rubber traffic markers and letters for pavements. C. H. Richardson and G. H. Fegley will be in charge.

Skinner Motors, Inc., Detroit, Mich., will exhibit Skinner oil reclaimers. Paul Williams, Walter S. Vance and Frank W. Brazel will be in attendance.

South Bend Lathe Works, South Bend, Ind., will exhibit a new model of the South Bend back-gear screw cutting lathes in Space 413. Those in attendance at this booth will be M. W. O'Brien, Pres.; J. J. O'Brien, Secy.-Treas.; F. C. Erhardt, Sales Mgr.; R. E. Frushour, Asst. Sales Mgr.; and R. S. Young, Engr.

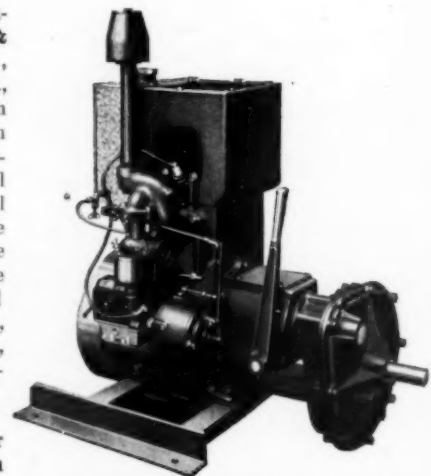


The New Hembell Spreadmix Finisher

Spears-Wells Machinery Co., Oakland, Calif., will have on exhibition the new Hembell Spreadmix finisher for laying bituminous roads.

Splitdorf Electrical Co., Newark, N. J., will display magnetos, spark plugs, switches, ignition cable and ignition coils in Space 206. J. Budd Bleiler, Gen. Sales Mgr.; E. D. Roach, Sales Mgr., Equip. Div.; and Lee L. Sable, Sales Rep., will be in attendance.

Stover Manufacturing & Engine Co., Freeport, Ill., will have on exhibition in Space 232 Stover vertical and horizontal engines. Lee Madden, Vice Pres. in charge of Sales, and C. T. Chronie, Chief Engr., will be in attendance.



A Stover Vertical Engine Fitted with Clutch and Reduction Gear

Superior Construction Equipment Co., Chicago, Ill., will exhibit in Space 254 a small power roller and trailer. W. R. Sostheim, Pres.; O. E. Quintin, Vice Pres. and Gen. Mgr.; and J. H. Erby, Secy. and Treas., will be in attendance.

Timken Roller Bearing Co., Canton, Ohio, will have Timken bearings on exhibition in Space 315. Representatives of the company who will be present are L. M. Klinedinst, Vice Pres.; W. B. Moore, Sales Mgr., Industrial Div.; S. M. Weckstein, Industrial Engr.; H. V. Fleming, Detroit Dist. Mgr.; G. W. Curtis, Milwaukee Dist. Mgr.; J. W. Weir, Cleveland Dist. Mgr.; and R. P. Kelley, Adv. Mgr.



Titeflex All-Metal Hose

Titeflex Metal Hose Co., Newark, N. J., will show Titeflex all-metal flexible fuel lines and Titeflex all-metal bendable exhaust tubing. This exhibit will occupy Space 408, with Elbert E. Husted, Sales Mgr., and D. A. Noble and R. R. Hazel, Sales Engrs., in attendance.

Toledo Scale Co., Concrete Aggregate Division, Washington, D. C., will show a Toledo compensating scale and continuous motion pictures of Toledo scales in use. Colonel Sidney F. Mashbir, in charge of the Concrete Aggregate Division and R. B. Longmate, Zone Engr., will be in charge of this exhibit, which will be located in Space 453.

Toncan Culvert Manufacturers Association, Massillon, Ohio, will exhibit in Space 303 Tonean copper molybdenum iron culverts in standard round corrugated, in nestable and in flat bottom sections, perforated drains, and Tyton sluice gates. Those in attendance will be L. S. Hamaker, Pres.; A. J. Roof, Secy.; C. W. Ruth, Adv. Mgr.; J. T. Hay, Metallurgist; P. A. Kelly and Ralph W. Baker.

Trackson Co., Milwaukee, Wis., will have on exhibition in Space 237 two Model G heavy-duty crawler tractors, a Trackson High Shovel and a 7-8-yard crawler wagon. W. H. Stiemke, Vice Pres. and Gen. Mgr.; L. E. Dauer, Sales Mgr.; R. D. Houghton, Mgr., Crawler Wheel Sales; L. E. Andrews, East-Central Rep.; and L. M. Clark, Central States Rep., will be present.

Twin Disc Clutch Co., Racine, Wis., will exhibit Twin-Disc clutches and power take-off units in Space 210. G. M. Guilbert, Sales Mgr., and R. H. Smith and W. T. Dixon, Sales Engrs., will be in attendance.

United American Bosch Corp., Springfield, Mass., will have on exhibition diesel pumps, nozzle holders and nozzles, generators, starters, spark plugs, magnets, horns and traffic semaphores. This booth will be located in Space 301 and the following representatives of the company will be present: L. Beeh, Vice Pres.; J. E. Wild, Vice Pres.; and A. C. Altire, F. N. Perry, Max Tost, Carl Behn, Jr., G. H. Cherry, F. J. Bartella, E. S. Fraser and L. C. Carlton, Mfrs. Sales Div.

Vellumoid Co., Worcester, Mass., will exhibit Vellumoid



A Twin-Disc Power Take-off Unit

sheet packing and gaskets in Space 440. Charles S. Livingstone, Sales Mgr.; James Crothers, Detroit Mgr.; and Paul Painter, Sales Rep., will be in attendance.

Walter Motor Truck Co., Long Island City, N. Y., will have on exhibition in Space 223 a truck complete with snow plow equipment, a Model FBS 130-horsepower 5 to 7-ton unit and a Model FN 2½-ton 85-horsepower unit. Those in attendance will be L. G. Stelzle, Pres.; Maurice Walter, Secy.; and James H. Sharkey, Sales Mgr.

Waukesha Motor Co., Waukesha, Wis., will have on exhibition the Waukesha 6-cylinder diesel of 180 to 200-horsepower, which will be shown for the first time, two special 6-cylinder engines in the industrial field with a number of improvements, a new power unit in the 10 to 20-horsepower range, which will also be shown for the first time, a special power plant for truck mixing units which is available in sizes ranging from 15 to 35-horsepower completely mounted as a unit, and a 4-cylinder 75 to 100-horsepower diesel engine. P. C. Ritchie, Adv. Mgr. in charge of publicity, is in charge of the exhibit, with H. L. Horning, Pres.; J. G. Swain, Sales Mgr.; J. A. Mahoney, J. M. Boorse, H. V. Kilpatrick, W. M. Jones, F. W. Gargett, and L. L. Bower also in attendance.

Wellman Engineering Co., Cleveland, Ohio, will exhibit in Booth 147 a 1-yard Williams Favorite clamshell bucket, a ¾-yard Williams Type MF bucket and a 1-yard Type DF dragline bucket, as well as photographs and literature on the Williams heavy-duty trailer, which business this company recently purchased from the G. H. Williams Co. There will be in attendance the following officials of the Wellman Engineering Co.: George W. Burrell, Pres. and Gen. Mgr.; A. E. Gibson, Vice Pres. and Asst. Gen. Mgr.; and H. P. Glidden, Gen. Sales Mgr. In addition there will also be in attendance the following who are now connected with the Williams Bucket and Trailer Dept.: W. C. Swalley, Mgr., Williams Bucket & Trailer Dept.; A. J. Lichtinger, Asst. Mgr.; Carl F. Weiblen, Sales Mgr.; and P. T. Robin, Engr.

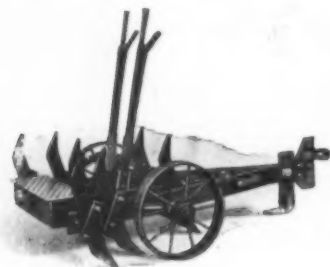


The New Model MF Williams Clamshell Bucket

Western Metal Specialty Co., Milwaukee, Wis., will have on exhibition engine houses, hoods, fenders, fuel tanks, mufflers and cowls in Space 418. Julius J. Goetz, Pres., and L. McIntosh, Engr., will be in attendance.

White Co., Cleveland, Ohio, will show the newly developed garbage, refuse and snow removal dump truck, a Model 643-SW 410 6-wheel unit for heavy hauling and a display truck equipped with all working parts. Those in attendance at this booth, which will occupy Space 243, will be George F. Russell, Vice Pres. and Sales Mgr.; J. N. Bauman, Sales Promotion Director; H. P. Starbird, in charge of the exhibit; J. R. Logan, C. I. Braley, R. J.

Soulen, J. R. Bryan, R. S. Lapham, R. E. Laisy and A. K. Brumbaugh.



The Wiard Grade-Ripper

Willett Manufacturing Co., Grand Rapids, Mich., will show for the first time the new Willett hydraulically-operated shoulder scraper for the maintenance of shoulders of all types of paved and asphalt roads and the Willett spring scraper, mounted on the new 4-ton Reo truck. This exhibit will be located in Space 125.

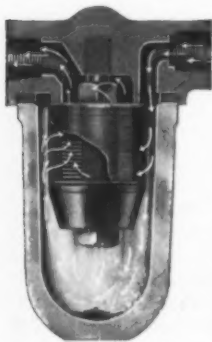
Winslow Government Standard Scale Works, Inc., Terre Haute, Ind., will exhibit in Space 441 contractors' scales of the wheelbarrow and bulk cement types. J. P. McKibben and W. J. Brennen will be in attendance.

Wire Reinforcement Institute, Washington, D. C., will display in Space 102 samples, photographs and models, including a special model illustrating the installation of wire fabric reinforcement in concrete pavements. Those in attendance will be R. D. Bradbury, Director, and J. S. Bureh, Research Engineer.

Wisconsin Foundry & Machine Co., Madison, Wis., will exhibit in Space 441 the new Badger roller bearing crushers in 9 x 36 and 15 x 38-inch sizes and a 30 x 16-inch roll unit for reduction crushing.

Wood Hydraulic Hoist & Body Co., Detroit, Mich., will exhibit in Space 307 full-size operating models of the D6, C12, F4C and W12 hoists, miniature working models of the mechanical Hi-Lift hoist, a cased exhibit of the mechanical hoist and a complete display of parts. Throughout the convention period the company will maintain open house to visitors at its Detroit plants.

Young Radiator Co., Racine, Wis., will exhibit in Space 230 new developments in heating cores both for convection heating and unit heating service as well as new developments in cooling for gas and diesel engines and for both water and oil cooling. The company will be represented by F. M. Young, Pres.; J. J. Hilt, Sales Mgr.; and William L. Walton, Sales Engr.



A View of the Zenith Fuel Filter

Zenith-Detroit Corp., Detroit, Mich., will exhibit in Space 308 a complete line of improved heavy-duty carburetors and filters for gasoline and fuel oil for diesel engines. V. I. Shobe, H. S. Manwaring and H. M. Hall will be in attendance.

Wiard Plow Co., Batavia, N. Y., will exhibit in Space 140 a No. 64 and a No. 69 contractors' plow, and a 7-tooth grade-ripper or scarifier. Representatives of the company who will be in attendance are Robert Male, Secy., and Henry Wiard, Asst. Supt.

A Complete New Method of Proportioning Concrete by Weight

AFTER several years of investigation the Toledo Scale Co., Concrete Aggregate Division, 934 H Street, N.W., Washington, D. C., has announced the Toledo method of proportioning concrete by weight, using the well-known Toledo springless scale with certain accessories for moisture determination and compensation, electric cut-off of the mechanically-operated gage and special illumination of the scales.

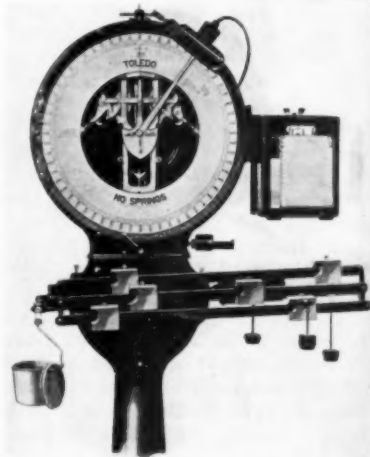
The Toledo Determination Auto-Gage is complete equipment for the determination of the specific gravity, percentage of surface moisture, sieve analysis and absorption by bone dry aggregates. It consists of a Toledo full-floating double-pendulum indicating mechanism supported by a column. The patented dial is specially designed for testing aggregates. All materials tested are placed in the container or bucket which is suspended from the lever extending to the left of the column and the reading properly indicated on the large dial.

When the Compensation Auto-Gage is added to this mechanism the contractor is in a position to produce batches of concrete with definite makeup and strength characteristics.

The machine illustrated shows how these devices are built for straight weighing operations on three ingredients entering into the mix and for weighing and compensating for moisture in three additional ingredients. The illustration shows a machine equipped with a graphic recorder and an electrical cut-off device. The locked graphic recorder produces a permanent ink record which is valuable for inspection purposes inasmuch as it tells just exactly how much of each material was used, the time of operation, and what corrections or compensations were made for moisture. The cut-off device permits the scale to be operated electrically so that the feed of materials may be shut off automatically, thus eliminating a large part of the human errors in weighing.

When used as a testing device, the materials are placed in the bucket or container shown suspended at the left side of the column. For weighing and compensating for moisture the materials going into the batch are dumped into hoppers or weigh bins, which are supported by a system of scale levers and connected to the indicating mechanism through a steel-yard rod extending down through the scale indicating mechanism supporting column.

The indicating device consists of a Toledo full-floating double-pendulum indicating mechanism supported by a column. The dial is especially designed for testing and compensating for moisture in connection with concrete aggregates. All of the dial readings are clearly indicated on the plainly printed dial surface. The details of operation covering the determination of surface moisture in making a sieve analysis, the moisture absorption of bone dry aggregates, the method of operation of the Auto-Gage in weighing and compensating for moisture are covered in detail in Bulletins 9902 to 9910.



The Toledo Determination and Compensation Auto-Gage

Motor Truck Tires

BALLOON tires for heavy-duty trucks are increasing in popularity every day. At the present time they are either standard or optional equipment on all makes of vehicles, and the number sold in the retail field increases each month. The popular conception that balloon tires are for light weight vehicles has been proved false, because balloon tires are not only operating in conventional heavy-duty service today, but also balloon tires are made up to capacities 50 per cent higher than the largest existing high pressure tire, according to a report from the Field Engineering Dept., Firestone Tire & Rubber Co.

The effect of balloon tires from the operator's standpoint is to lower maintenance cost and also adapt the trucks to year-around service under all trucking conditions. For high speed operation the balloon tire is outstanding in performance above the high pressure tire from the standpoint of safety, reliability and economy. This is due to the lower operating air pressure and ability of the tire to absorb shock and hold the road.

One of the most important features for contractors to observe at the present time is the overall width of their truck units at the tires. Due to the large amount of legislative activity during the past year, state highway departments have been exercising their authority in prohibiting the operation of vehicles which exceed the legal limit on overall width. In some cases the line has been drawn so fine that where the maximum width limit is prescribed at 96 inches, trucks with a width of 96¼ inches have been prohibited from operation.

Generally speaking, greater economy is obtained through the use of dual equipment than with singles of equivalent carrying capacity. Likewise the other benefits to be derived from dual application—namely, lower loading height, lower center of gravity, simplification of spare tire problem, etc.—result in the widespread use of duals.

This immediately brings about a problem which does not exist in single equipment—that of load distribution over the dual set up. Taking first, road conditions, one finds that the load shifts from one tire to the other, resulting in momentary overloading of one tire, particularly the inside, and occasionally resulting in unsatisfactory tire performance, either from tread wear or premature failure. This is particularly true on crowned roads where the inside tire carries more than its share of the load. Under these conditions of operation it is more important than ever to maintain proper inflation pressure. Sometimes under conditions of particularly heavy road crown, 10 per cent higher than the standard inflation is recommended for the outside tire. This tends to shift the load to the outside tire and relieve the inside tire.

The second condition is load distribution on dual tires due to mechanical conditions. Particularly on trailers, some very bad effects due to overloading have been observed. In other words, the customary practice of carrying 50 to 150 per cent more pay load than the vehicle is rated to carry results in sprung or bent axles. This is particularly true on trailers and actual conditions have been found where wheels have had an initial positive camber with no pay load, and would actually assume a reverse camber when the vehicle is overloaded, due to bending of the axle. This does not always result in a permanent set in the axle, and it therefore becomes necessary when checking for this condition to do so under full load. This condition greatly overloads the inside tire with consequent unsatisfactory tire service and serious road delays.

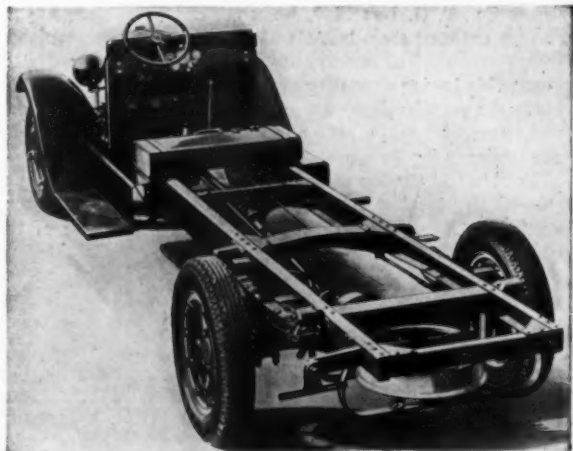
Likewise in overloaded equipment it is found that the axle bends from front to rear under the application of brakes, resulting in a momentary toe-out of the tires, and a consequent scuffing and irregular wear. The net result of all this action is a very unsatisfactory condition of tread wear and frequently complete failure of the tire. The only remedy for a condition of this kind is to reinforce the axle or install a new axle of suitable rated capacity for the pay load actually being carried.

Another item of interest to truck users is the new convertible valve being adopted by most tire manufacturers as standard equipment. One of the problems in servicing of truck tires has been accessibility of the valve for inflation. Due to the smaller wheel diameter, use of large duals, variations in wheel design, brake drum design, etc., it has been increasingly difficult to inflate the tires. The final result was a number of different styles of valves of straight, single bend and double bend types, each designed for a specific condition. By means of the new convertible valve, which is designed to be bent to any desired shape, it is possible to fit a valve to a particular wheel condition and provide more accessibility for inflation, as well as eliminate the present complicated set up. A special tool is provided to tire dealers for this valve bending. This should prove of great value to truck operators, in speed and accuracy of inflation servicing.

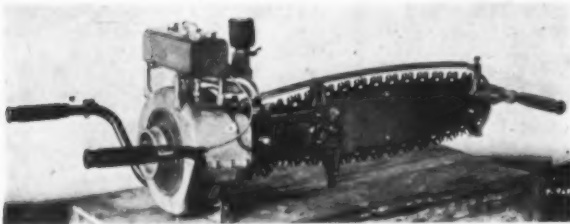
A New 6-Cylinder 1½-Ton Truck

ANNOUNCEMENT has recently been made by the International Harvester Co. of America, Inc., 606 South Michigan Ave., Chicago, Ill., of the new International-Harvester Model A-3, 6-cylinder, 1½-ton truck with a 136-inch or 160-inch wheelbase. The 6-cylinder engine which powers the new A-3 is of the detachable L-head type with 3¼ bore x 4½-inch stroke. Its piston displacement is 224 cubic inches. The engine develops a maximum brake horsepower of 54 at 2,700 rpm. Its maximum torque is 138 foot-pounds at 700 to 1,000 rpm, and it is claimed to be unusually economical in fuel and oil consumption. The clutch is of the single-plate type with a built-in vibration damper while the transmission provides four speeds forward and one in reverse.

The frame is of heavy pressed steel channels, 7 inches deep at the center and reinforced with numerous cross members which assure rigidity with ample flexibility to meet varying load and road conditions. The front and rear springs are of the semi-elliptic type and auxiliary rear springs of the same type are also provided. The rear axle is of the full-floating, spiral-bevel-gear type with axle shafts of chrome-molybdenum steel. The pinions, differential and wheel bearing are of the tapered roller type. The truck is equipped with 4-wheel mechanically-operated internal-expanding, shoe-type brakes and the cam-and-lever steering gear provides easy truck control at all speeds. Cast, spoke-type wheels with 30 x 5 front and 32 x 6 rear tires are standard equipment. Dual rear tires are also available.



The New Model A-3 International-Harvester
1½-Ton Truck



The New Gas-Engine-Driven Wolf Portable Timber Saw

A Gas-Engine-Driven Portable Timber Saw

THE electric and air-driven Wolf portable timber saw, made by Reed-Prentice Corp., Worcester, Mass., and over 500 of which are in use in the railroad, mining, marine, general construction and other fields, now has a companion unit in a gas-engine-driven saw of the same type. The chain, saw frame and drive units are the same on all models. The saw housing connected with the gas engine is made to swivel providing for horizontal or vertical cutting, as in felling and bucking timber. The two-cylinder opposed four-cycle type gas engine is of the latest aircraft practice in design and materials. It develops 8-horsepower at 3,600 rpm and weighs only 46 pounds. The engine is controlled by a rolling motor-cycle type of throttle and is stopped by a thumb latch on the other handle which breaks the connection. The engine is started with a cord on the principle of the outboard motor. This gas engine is available as a separate unit for industrial use such as on pumps, construction machinery, railway hand cars, and light and power plants.

The 16 and 24-inch Wolf gas-engine timber saws weigh complete 70 and 73 pounds respectively. This saw has been thoroughly tested in the field and was demonstrated in several places, including the summer meeting of the Canadian Pulp & Paper Association at which time it cut a balsam tree at the stump, cutting a 10-inch stump in 6.2 seconds and felling an 11-inch stump in 15 seconds.

A Complete Bulk Cement Batching Plant

A BULK cement plant which in general arrangement follows the more or less conventional design of equipment generally employed in storing, batching and weighing mineral aggregates has been announced by Warren Brothers Roads Co., P. O. Box 1869, Boston, Mass. The plant has an entirely enclosed chain belt elevator with a steel boot equipped with a screen. The elevator discharges into an elevated steel storage bin having a capacity of 40 barrels of bulk cement. The bin is of a peculiar shape, having vertical side plates and sloping end plates, this shape preventing arching and compacting and any tendency for the cement to "hang up" in the bin.

The bin and the top of the elevator are supported by a substantial structural steel tower designed with bolted field connections. The relatively small size and peculiar shape of the bin greatly facilitate erecting, dismantling and shipping. Suspended directly beneath the operating platform is an enclosed tip-over type weighing hopper. This hopper is supported on a specially designed enclosed hopper-type scale, which is provided with two indicators, one in connection with the charging beam and the other in connection with the tare beam. Both of these indicators are plainly visible to the operator. The weighing hopper is electrically locked in its receiving position and cannot be unlocked or inverted to the discharging position until it has received the actual required weight. When the required weight has been attained, the charging beam makes

contact through a mercury switch, by which electric current is delivered to the solenoid as the operator presses a button. This releases the solenoid plunger and allows the operator to invert the weigher to the discharging position where it again locks by means of a second solenoid.

The weigher cannot be restored to its receiving position until it is empty at which time the tare beam makes contact through a second mercury switch, which permits the release of the weigher when the operator presses an electric button.

The cement is conveyed from the elevated storage bin to the weigher by a short and entirely enclosed helicoid worm conveyor placed in a horizontal position beneath the bin outlet. The discharge end is provided with a heavy hinged gate which fits tightly to the end of the conveyor tube. There is also attached to the bottom of the bin an encased rotating feeder which feeds the cement downward from the bin to the worm conveyor. The feeder is operated by a gear and pinion from the drive shaft of the worm and is so designed and regulated as to speed and capacity that it provides sufficient cement to keep the worm feed approximately three-quarters full. The screw conveyor, and in turn the rotary feeder, are operated by a friction clutch which is instantaneous and positive in its engagement and release. The opening and closing of the hinged gate at the end of the screw conveyor is also synchronized with the starting and stopping of the feeding equipment so that the gate opens the instant that the feed starts and closes the instant that the feed stops. This prevents dribble or over-run and prevents compacting and clogging of the cement in its travel from the bin to the weighing batcher.

The entire operation of the plant is controlled by one man manipulating one hand lever and one electric button. Power for operating the elevator, feeder and screw conveyor is provided by a gasoline engine mounted on the plant platform. The operator is so located that he can observe the entire operation of the plant as well as the spotting of the batch to the trucks beneath the batcher discharge chute. The method of discharging the cement from the cars to the plant is optional.



The Warren Bulk Cement Handling Plant Showing a Bottom-Dump Cement Cart in Discharging Position Over the Boot of the Elevator

A Mechanical Chip Spreader with Agitator

A MECHANICAL chip spreader with a road wheel which operates a spiral agitator running across the body of the unit, and which may be attached to a motor truck in one minute, has been placed on the market by the Adnun Engineering & Manufacturing Co., Nunda, N. Y. The Adnun N & H mechanical spreader consists of a steel trough which is suspended below the tail gate of the truck and receives material from the truck as the body is raised. A rubber-tired wheel at one end of the spreader serves to keep the material agitated by a spiral rod so that an even constant flow of the material is delivered to the road. Attaching the spreader to the truck is merely a matter of hooking on two ratchet locks and brake winches, connected by a plow-steel cable. The spreader will supplant the hand labor of from fifteen to twenty men and will give a more even spread over the road surface.

The spreader is equally as effective whether the truck is moving forward or in reverse. Adjustment for change in direction is easily made by simply throwing an auxiliary lever.



The Adnun Chip Spreader Mounted on a Truck

The weight of the spreader is carried by the truck. The width of the spread is adjustable from 6 inches to 9 feet by means of hinged doors inside the hopper. This is particularly advantageous when narrow strips of road are to be surfaced. The amount of material to be discharged is regulated by means of a sliding gate, controlled by a lever conveniently located at the end of the hopper. The N & H mechanical spreader will spread sand, gravel, calcium chloride, crushed stone or slag with equal effectiveness. It is used in cities for spreading sand on icy streets, steep hills, and on road intersections in winter, and for spreading the fine stone on top of penetration macadam or seal stone on mixed-in-place construction as well as for uniform distribution of fine crushed stone over an asphalt binder to produce non-skid surface.

Hitch Your Scraper to a Crane

ONE of the latest ideas in dirt moving is the hooking up of a scraper bucket with a revolving dragline or crane for any work that requires moving earth or other loose materials several hundred feet beyond the reach of the crane or dragline. It is relatively easy to rig up any type or make of boom machine for operating a Crescent scraper bucket made by Sauerman Bros., Inc., 464 South Clinton St., Chicago, Ill. Aside from possible changes in its drum as a dragline or crane, it seldom requires any mechanical alterations. Occasionally, it



A Crescent Bucket Rigged Up with a Revolving Dragline to Give This Machine a 300-foot Reach

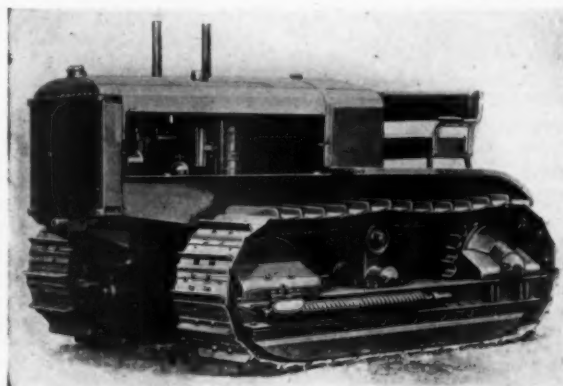
is desirable to provide an outboard support or guy cable for the boom when the digging is particularly difficult.

The regular drag cable is replaced with a longer cable which is attached to the front chains of the scraper bucket. The regular hoist cable also is replaced with a longer cable, which runs out to a movable tail anchorage and serves as an inclined track-line for the carrier and bucket.

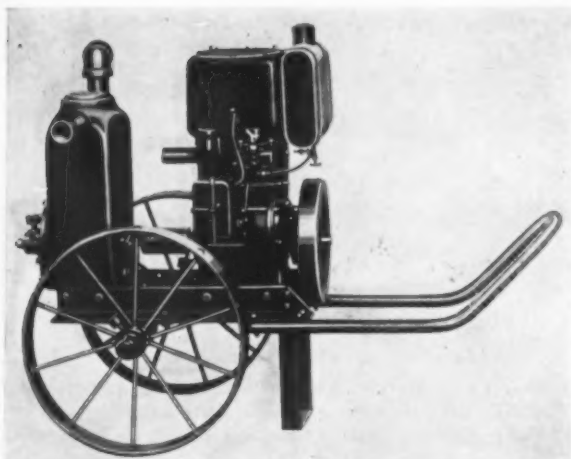
There is no raising and lowering of the boom. Instead, the boom generally is held at its maximum elevation during the entire operation. The track-line is slackened off while the bucket is digging and bringing in a load, but when the bucket arrives at the dumping point, the operator pulls this cable taut by a few revolutions of one drum, thereby raising the bucket into the air. As the bucket is bottomless, it deposits its load automatically when it is lifted. Then the load cable is allowed to unwind from the other drum, and the carrier, impelled by gravity, carries the empty bucket back down the inclined track cable to the place of excavation. In equipping a boom machine with a scraper bucket, it is generally practicable to use a Crescent of a capacity substantially larger than the standard dragline bucket for which the machine is rated.

A New 6-Cylinder Track-Type Tractor

A 6-CYLINDER track-type tractor known as Model L has been announced by the Allis-Chalmers Manufacturing Co., Milwaukee, Wis. This machine has six forward speeds ranging from 2 to 6½ miles per hour, has force feed lubrication, air, oil and fuel filters, removable cylinder sleeves and other features. The tractor has a low center of gravity combined with high road clearance, and will handle heavy-duty power take-off elevating graders in all workable conditions of road and soil as well as the largest snow plow in heavy drifts, according to the announcement of the manufacturer. The tractor has a stream-line appearance, and takes its place in the Allis-Chalmers line as a big brother to the Model 35.



The New Allis-Chalmers Model L Crawler Tractor



The New Novo 2-inch Self-Primer Mounted on a 2-wheel Hand Truck

A 2-Inch Self-Priming Centrifugal on a 2-Wheel Truck

A NEW 2-inch self-priming centrifugal utility pump has been added to the Novo line of self-primers which includes a 2-inch, two-types of 3-inch, a 4-inch and 6-inch, all powered with Novo engines or electric motors, and made by the Novo Engine Co., Lansing, Mich. The new 2-inch self-priming pump includes the features which are common to this line of self-primers such as the absence of accessories to perform the priming operation. Priming is accomplished by the arrangement of the ports and passageways which is such that the priming water cannot be thrown out of the discharge but will circulate until it has expelled the air from the suction pipe. This makes it possible for the pump to be really self-priming.

The steel impeller is of the open type, making it possible for the pump to handle a large portion of solids such as sand, gravel, muddy water and silt without damage to the pump. The arrangement of the passages is such that there are no pockets to catch the solids that might plug the pump. The self-cleaning feature is effected by directing the main stream of water down and through the bottom of the casing after the water has passed through the impeller. Any solids that would drop to the bottom of the pump are in this way swept out into the discharge.

The 2-wheel truck on which the pump is mounted makes it handy to transport to the job and move around on the job by one man for there is less than 50 pounds weight on the handle. The pump weighs approximately 500 pounds and will deliver 220 gallons per minute against a total head of 20 feet, 200 gallons per minute against a head of 30 feet, 160 gallons per minute against a head of 40 feet and 110 gallons per minute against a head of 50 feet.

A Large and Easily-Operated Grader

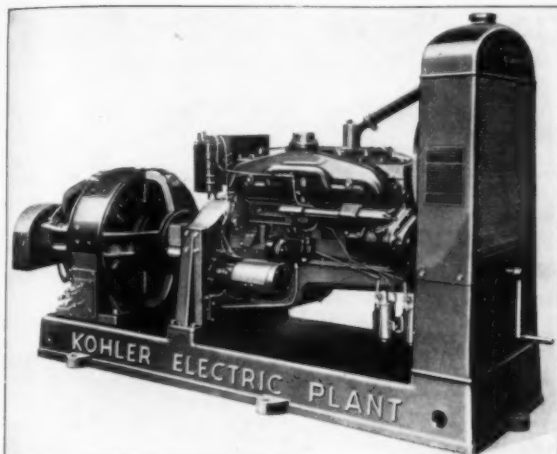
THE new Austin 101 grader, according to its builder, is bigger and stronger and yet easier to operate. This grader, a product of The Austin-Western Road Machinery Co., 400 No. Michigan Ave., Chicago, Ill., is equipped with a blade 23 inches high having a 90-pound railroad rail stiffener, a large back-bone or frame of box-shaped construction consisting of two 12-inch channels weighing 35 pounds to the foot to which heavy top and bottom plates are continuously welded. The bottom plate extends the entire length of the frame, reaching and embracing the wide rear portion to prevent end distortion when a heavy upward thrust is imposed by the blade. The front end of the frame is further reinforced against twisting by a heavy steel casting that is machined on both sides to fit tightly, and which is securely bolted between the side channels.

Heavy Z-shaped members form the draw frame for the circle, and the one-piece cast steel circle with blade arms welded in place is considered practically unbreakable. The heavy rear axle is constructed of high carbon steel angles and the front axle and king post are of unit construction, securely welded together. The engine hitch is of built-up channel construction. The forward ends of the pole channels are securely riveted to a steel swivel pin casting of such lengths as to insure strength and long life. A large drop-forged clevis is hinged to the swivel pin, forming a universal connection with the tractor to eliminate binding or bending. The line of draft is straight from the tractor drawbar back to the circle. No part of the power applied to the blade is in any way transmitted through the frame. The pole is flexible so that it is free to rise 44 inches above or fall 44 inches below the normal point of attachment to the tractor.

All principal gears of this grader have machine cut teeth and are made of steel, malleable iron or bronze. The blade lift worm gears are made from bronze rings with cut teeth, and these rings are bolted to cast steel hubs in such a manner that their position can be shifted when wear develops. The hubs are taper fit on the lifting shafts, both ends of which are carried in large roller bearings which are sealed to prevent grease leakage and to exclude dirt. The vertical lifting arms are of all steel telescopic construction and have double support ball joint sockets at each end.



The New Austin 101 Grader



The New Kohler 25-KVA Electric Plant

Two Large Capacity Portable Electric Plants

TWO new electric plants of 20-kw D. C. and 25-kva capacity A. C. have been announced by the Kohler Co., Kohler, Wis. These plants have been developed to meet special needs such as emergency installation on large ships and barges, to light small communities where centralized current can be used, and particularly at construction camps and on construction work. In construction and operation the 20-kw and the 25-kva plants resemble the 5 and 10-kw Kohler units. The new plants are powered by 6-cylinder heavy-duty industrial engines of the L-head type, with removable cylinder heads. The extra heavy crankshaft is supported by seven main bearings and full pressure oiling is used to all engine bearings.

Cooling is by means of a large size radiator and water circulation pump. The radiator fan is driven by double V belts, either of which is of ample size to drive the fan. Two are used as a safety factor. The starting system of the new plants is 12-volt and is controlled by a special relay system in order that the unit may be started and stopped by the closing or opening of a two-wire starting circuit. The plant will start and will continue to run as long as this circuit is closed. A 12-volt starting battery is kept charged automatically by a generator mounted on the side of the engine. Standard 110 and 220-volt current is generated by the new plants. The D. C. generators are of the revolving armature compound wound type and the A. C. generators are of the stationary armature and revolving field type with a direct-connected exciter. All models are furnished with or without a switch-board.

Stationary and Semi-Portable Asphalt Plants

CONSERVATIVE hourly ratings for the production of either hot-laid sheet asphalt, binder course, asphaltic concrete and Topeka mix, or any cold-laid mixtures for N-Y-C asphalt plants are 20, 30, 40 and 50 tons for the stationary type and 10, 15 and 20 tons for the semi-portable type, according to the manufacturer, the New York Central Iron Works Co., Inc., Hagerstown, Md. These capacities are based upon the production of 30 batches per hour from the mixer and a moisture content not to exceed 8 per cent in the cold aggregate which is given a temperature rise from a mini-

mum of 50 degrees to 350 degrees Fahrenheit when oil burning equipment is employed for heating. The driers are built in three distinct types, each for its special purpose. Change over for the production of either hot or cold aggregate from the combination drier can be made in a few minutes by one man.

N-Y-C driers are of the revolving drum type, constructed of heavy steel plates rolled to a true diameter. Renewable flights of special design are provided inside the shell of the drum. The drum revolves on wide face tracks of locomotive tire steel. These tires ride on large diameter trunnion rollers made of cast iron with chilled faces. The self-contained combustion chamber is of steel plate construction, strongly reinforced with angles, with provision for a refractory lining and oil firing.

The cold elevator head shaft is driven by its own motor and speed reducer. The chain and bucket line have adjustable take-up bearings at ground level. The cold-elevator support is designed so that the elevator can easily be swung to an arc of 180 degrees. This permits feeding the elevator from either side on all type driers and also from the end on the hot-mix drier. A slow speed heavy steel plate exhauster is provided to carry off the vapor gases and waste heat from the drier with a minimum of dust. The dust collector is of large capacity and located on its own supporting frame beside the drier without elbow connections or long lengths of pipe.

The dry elevator has a sufficient capacity to handle 50 per cent more than the rated output of the plant. The head shaft is driven direct by its own motor through flexible couplings and an enclosed speed reducer. A revolving screen is standard or a vibrating screen can be furnished. The screen is driven from the elevator head shaft and is completely covered with a heavy steel plate housing making it weatherproof. The screen grades the materials, discharging each size into its respective bin compartment. Oversize tailings are discharged outside the bin through a chute.

The bin capacities are 50 per cent greater than the hourly rated capacities of the respective plants. The materials are weighed separately at the mixing platform into a weigh hopper with a large dial. The weigh hopper is designed for discharging the full length of the mixer. The opening between the bottom of the bin and the top of the hopper is made practically dust-tight. The asphalt bucket is suspended from a 2-beam scale and is so designed that it will discharge its contents in a thin sheet the full length of the mixer. For loading trucks from a plant built for railroad car loading, the use of a steam jacketed chute is recommended.

The asphalt mixer is of heavy flanged plate construction throughout. The blades have manganese steel tips bolted to cast steel shanks with adjustable spacers between each pair of blades. The liners are rolled manganese steel in six sections bolted to the body of the mixer and in two sections bolted to the back of the gate.



A Typical N-Y-C Asphalt Plant Set-Up



The New Galion Mixing and Leveling Drag

A New Machine for Mulch or Retread Work

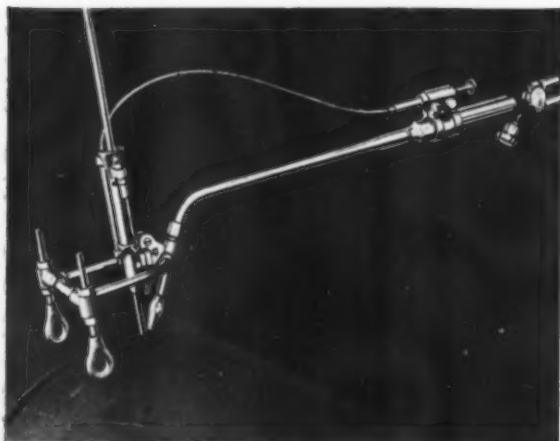
A NEW mixing and leveling drag especially designed for mulch or retread work which mixes the material thoroughly and levels it ready for rolling has been announced by the Galion Iron Works & Mfg. Co., Galion, Ohio. This machine is a development of the multiple blade maintainer but it has 15-inch moldboards and double bevel blades for edges instead of the flat blades of the maintainer.

The Galion mixing and leveling drag is furnished with direct tractor hitch, rubber-tired wheels, Timken wheel bearings, enclosed lift gear cases operating in grease, and the weights are counterbalanced by springs so that the controls operate easily. There is a spring-mounted operator's seat and all four controls are conveniently located for the operator.

A wide range of adjustment is provided by the controls and, in addition, the machine provides further adjustment of the strike-off blade and the drag unit. The strike-off has a three-piece blade, adjustable for crown, and a plumb bob and a degree indicator for slope. An automatic edger, 22 feet long, is built into the machine to prevent choppy "road waves." The machine is 10 feet wide and the rear strike-off is 11 feet long.

A New Welder with Two Flames

A NEW oxyacetylene welding blowpipe which utilizes two flames, one for preheating the welding rod and one for performing the actual welding operation, has been announced by The Linde Air Products Co., 30 East 42nd St., New York City, in the Oxweld W-21 Lindewelder. The upper or preheating flame is so adjusted that the inner cone impinges directly upon the rod, preheating it practically to the melting point. Consequently little heat is required from the welding flame to melt the rod. The welding flame is directed so that the rod is melted and simultaneously fused with the base metal.



The Oxweld Type W-21 Lindewelder

The carriage which supports the blowpipe during the welding operation can be adjusted to maintain the proper position for welding on flat plate or on all sizes of pipe from 4 inches upwards. The two carriage runners straddle the weld directly behind the welding puddle. They can be adjusted in length, making it possible to maintain the proper position for all types of work. The Lindewelder can be used with five sizes of welding heads ranging from No. 9 to No. 13 inclusive. Detachable tips are furnished for preheating in sizes corresponding to the size of welding head being used.

The rod holders are furnished for $\frac{3}{8}$, $\frac{5}{16}$ and $\frac{1}{4}$ -inch welding rod. The holder is controlled by a trigger on the blowpipe handle which permits the operator to raise and lower the welding rod at will. This feature is used when rewelding tack welds and in starting and completing the weld.

A Semi-Automatic Dipper Trip

A S a means of doing away with the old jerking of the trip rope the Morin Mfg. Co., 896 Main St., Holyoke, Mass., has developed the Universal semi-automatic dipper trip. This dipper trip consists of a shaft running continuously, driven by one of the shovel gears. On the shaft are mounted two friction discs and a drum, a small spring-actuated disc to take up the slack in the trip line, and a larger disc to trip the bucket. The small disc exerts a line pull of approximately 7 pounds, which is sufficient to hold the cable without slack. The larger disc will exert a pull up to 400 pounds which is sufficient to trip the most stubborn latch.

The dipper tripping control is made a part of one of the regular operating levers. When the operator is ready to trip the load he merely twists his wrist, bending the handle to the left, which causes the drum to pull the trip line releasing the latch and tripping the bucket instantly. Inasmuch as this device will exert a 400-pound pull, the dipper latch can be adjusted so as to hold the door closed and there is no need for hair-trigger latching. These dipper trips are made to fit any power shovel and are in use by a large group of contractors engaged in dirt moving and excavation.



The Universal Semi-Automatic Dipper Trip

A Road Builders' Hose for Severe Service

A HIGH grade water hose designed to give extraordinarily long service under severe working conditions and known as the Maltese Cross Multi-Cord water hose is made by the Hewitt-Gutta Percha Rubber Corp., Buffalo, N. Y. The manufacturer states that the best materials that can be obtained are used in its manufacture. The heavy maroon cover is $\frac{1}{8}$ -inch thick and is a very tough compound, protecting the hose against injury and enabling it to withstand abrasion. The carcass is made up of four plies of braided yarn of selected quality and high tensile strength, making the hose suitable for high working pressure. The insulation of the best grade of frictioned rubber assures great adhesion between plies and between the carcass and the tube and cover of the hose. The tube is $\frac{3}{32}$ -inch thick and is of high grade rubber compounded to age indefinitely without stiffening and the construction of the hose throughout assures strength and flexibility. As the ordinary type of hose will not stand the wear and tear and abuse or the high pressures required in this service, only the highest grade hose should be used.



The New Fudom 1/3-Yard Gasoline Shovel

A One-Man 1/3-Yard Power Shovel

A 1/3-yard gasoline power shovel of simple design built for economical operation and low upkeep cost is manufactured by the Fudom Hoist & Shovel Co., Lima, Ohio. The power unit of the Fudom shovel is a Fordson tractor which operates the shovel and drives the 9-foot 6-inch steel tread crawlers through the tractor axle. The boom is built up of 8-inch channels reinforced with plates and ties and is 12 feet long. The mast consists of two 6-inch channel members fastened at the lower end to the yoke casting while the upper end supports the mast head casting. The crowding mechanism is operated by a double-pad special lined clutch driving a link chain to the support shaft which carries two steel machine cut pinions which mesh with the steel machine-cut racks on the dipper handle.

The shovel has a traveling speed of 2 1/2 miles an hour. It is operated by three hand levers and two foot pedals all conveniently located and which control all the digging operations. The boom travels a full three-quarter circle and with the 1/3-yard bucket can handle from 15 to 30 cubic yards an hour, depending upon working conditions and the materials handled.

An Asphalt Mixing Plant

THE Coatesville asphalt mixing unit, manufactured by the Coatesville Boiler Works, Asphalt Equipment Department, 50 Church St., New York City, is a structural steel tower in which is mounted all of the equipment necessary for mixing asphalt pavement. It supports the hot material elevator and its driving mechanism at the top, the screen for sizing and distributing the material to the various storage bins; the storage bins for the hot material, dust and tailings; the weighing hoppers and scales; and the mixer with its driving mechanism. Trucks are loaded directly beneath the mixer.

The hot material elevator is a continuous chain of cast steel, with renewable bushings, carrying buckets of ample size. It is enclosed in a dustproof steel housing and is driven by an individual motor through an enclosed gear reducer running in

oil. The hot material is discharged into a screen which separates the material into the required number of grades, discharging them into their respective storage hoppers. The chutes are provided with renewable liners and provision is made for easy replacement of the worn parts of the screen. Bins are normally furnished with two compartments, with an auxiliary hopper for tailings. To meet special requirements bins may be furnished with one, three or four compartments. The gates at the bottom of the bin are arranged for easy operation by the man on the mixing platform and discharge directly into the weigh hopper, which in turn discharges into the mixer. Multiple beam scales with an auxiliary dial are provided to meet individual requirements. A tilting asphalt bucket mounted on a two-beam scale with an auxiliary dial is also located to discharge into the mixer.

The mixer, which is of the double shaft, jacketed pug mill type, is driven by an individual motor through reducing gears, which are enclosed in a dustproof housing and run in oil. The mixer is provided with renewable rolled manganese steel side and gate liners. All bearings are ball or roller type and flexible couplings are used between the units. The mixer blades are cast steel and tips of cast manganese can be furnished in several designs if required.

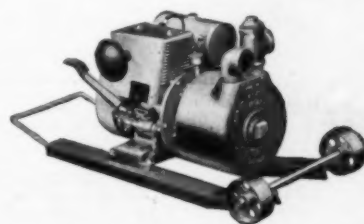
The various units are arranged so that one man located on the mixing platform controls and operates the weighing and mixing of all material. Necessary stairways, ladders and walkways for convenient access to all parts of the plant are provided. When dust handling equipment is required a fully enclosed chain and bucket type dust elevator can be furnished, which discharges into a hopper bin supported on the tower. The dust is fed directly to the weigh hopper through an enclosed worm conveyor of special design, driven by an individual motor. Special provision is made for an accurate control of the amount of dust fed.

Units are furnished in three sizes, 20, 30 and 40 tons per hour, and, with the Coatesville mixer, having a capacity of 1,400, 2,000 and 4,000 pounds respectively.

A 220-Pound Positive Priming Pump

A N automatic positive priming pump which works with suction lifts up to 25 feet and pumps air or water or a mixture of air and water has been announced by the Sterling Machinery Corp., 2303-07 Holmes St., Kansas City, Mo. This Ejectoprime pump, weighing only 220 pounds and complete with a strainer is mounted on a 2-wheel truck. It is useful as a seepage pump as it picks up water as soon as it accumulates. There are no valves, no pistons, no cams and no chain drives or floats.

The engine is of the vertical single-cylinder air-cooled 4-cycle type developing 1 1/2 horsepower at 1,800 rpm. It is of modern design and complete with carburetor, magneto, adjustable governor, gasoline tank and accessories. The pump will handle 9,240 gallons of water per minute against a head of 10 feet, 5,160 gallons at a 30-foot head and 720 gallons at a 50-foot head. No foot valves and no packing are required. A gear-driven step starter is included in the equipment.



The New Sterling Ejectoprime Pump

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Air Compressors and Hoists

417 O. K. air compressors, which are reliable and economical and are made in two sizes, 120 cubic foot and 240 cubic foot, as well as O. K. hoists, are described in literature which the O. K. Clutch & Machinery Co., Box 305, Columbia, Pa., will be glad to send on request.

A Speedy Column Clamp

418 Complete information in regard to the W. A. K. One-A-Minute column clamp which weighs only 1½ pounds, has three parts, fits all columns and is easy and economical to use may be secured by interested contractors from W. A. Kuhlman & Co., 340 Water St., Toledo, Ohio.

Earth Moving and Grading Equipment

419 Complete information in regard to Baker Maney self-loading scrapers, which dig, load, haul, dump, spread and compact and which are made in 1½, 1 and ¾-cubic yard capacities for 20 to 75-horsepower tractors, may be secured by those interested from the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill.

High Pressure Couplings for Paver Hose

420 Mulconroy high pressure couplings for paver hose which will not injure the tubes or cover of the hose are described in Catalog 80 E issued by the Mulconroy Co., Inc., P. O. Box 4532, Philadelphia, Pa. This catalog also describes the complete line of steam, air, gas, oil and water hose.

Portable and Stationary Asphalt Plants

421 The F. D. Cummer & Son Co., 2016 Keith Bldg., Cleveland, Ohio, will be glad to furnish on request complete information in regard to Cummer portable and stationary asphalt plants, hot and cold-mix plants, Cummer dryer-coolers and two-fire dryers.

Floodlighting for Outdoor Construction

422 The economy and safety of floodlighting outdoor construction work in many fields is illustrated and discussed in a 4-page folder recently issued by the General Electric Co., Schenectady, N. Y.

Crawler Dump Wagons

423 Euclid Road Machinery Co., Cleveland, Ohio, will be glad to send to those interested complete information in regard to Euclid crawler dump wagons which are designed to handle large loads easily, quickly and economically.

A Complete Line of Hoists

424 Full information in regard to Lidgerwood hoists, among the features of which are a powerful motor, rugged frame, cork-inserted frictions, chain drive and auto-mechanical brake, may be secured by interested contractors from the Lidgerwood Manufacturing Co., 775 Lidgerwood Ave., Elizabeth, N. J.

A ¼-Yard Convertible Shovel

425 General Excavator Co., 220 Rose St., Marion, Ohio, will be glad to furnish to those interested full information in regard to the General ¼-yard convertible shovel-dragline-backhoe-clamshell-crane-skimmer which is rugged in construction, reliable and powered with a 62 to 71-horsepower engine.

Five to Fifteen-Ton Rollers

426 A complete description of Huber 4-cylinder road rollers which are dependable, economical and made in sizes from 5 to 15 tons, may be secured by interested contractors from the Huber Manufacturing Co., 330 E. Center St., Marion, Ohio.

An Improved Line of Road Building Equipment

427 Heltzel Steel Form & Iron Co., 1750 Thomas Road, Warren, Ohio, will be glad to send to those interested complete information in regard to the entire Heltzel line of road building equipment, including batchers, bulk cement handling equipment, concrete road finishers, steel curb and gutter and road forms, subgraders, screeds, straight-edges and subgrade testers.

A Mechanical Chip Spreader With Power Agitator

428 The Adnun mechanical chip spreader which spreads from 6 inches to 9 feet wide and takes the place of fifteen to twenty men is described and illustrated in literature which may be secured from the Adnun Engineering & Manufacturing Co., Nunda, N. Y.

Slip Scrapers, Wheel Scrapers and Road Drags

429 The B. W. & Leo Harris Co., Minneapolis, Minn., will be pleased to send a copy of its Folder No. 30 which describes Russell better-built road equipment including fresno, slip or buck scrapers, drag scrapers, road plows, road drags and Russell wheel scrapers.

A New Gas-Engine-Driven Portable Timber Saw

430 Reed-Prentice Corp., Worcester, Mass., has announced a gas-engine-driven model of the Wolf portable timber saw as a companion to the AC and DC electric and air-driven machine over 500 of which are in use in the railroad, mining, marine and general construction field. A description and prices will be furnished on request.

A Self-Contained Bulk Cement Batching Plant

431 A new completely self-contained bulk cement batching plant has been announced by Warren Brothers Roads Co., P. O. Box 1869, Boston, Mass. A description of this plant with full details may be secured direct from the manufacturers.

A New Pneumatic Tractor Tire

432 Complete information regarding the new Goodyear pneumatic lug tractor tire, a brand new development which gives more power, a more even pull, more speed and less breakage depreciation and tire expense for tractor-operated road machinery, may be secured from the Truck & Bus Tire Department, Goodyear Tire & Rubber Co., Inc., Akron, Ohio.

A New Roller Drive Chain

433 Bulletin R-50 issued by the Morse Chain Co., Ithaca, N. Y., describes the new Morse roller chain that has a distinctly different joint construction than that common to all other roller chains, and constitutes a real advance in roller chain construction for both high speed and lower speed drive, for all types of machinery.

A 2-Ton Asphalt Plant Mixer Unit

434 Complete information regarding a new 4,000-pound asphalt plant mixer unit with a radically different steam-operated discharge gate may be secured direct from Hetherington & Berner, Inc., Indianapolis, Ind.

Iron Pipe Railings

435 Complete information and prices on iron pipe railings for stairs, bridges or retaining walls may be secured by interested contractors from the Pipe Railing Construction Co., Fifth St., Long Island City, N. Y.

Conveyors for Material Handling

436 Conveying Weigher Co., 90 West St., New York City, will be glad to send to those interested complete information in regard to the Conweigh conveyors and conveying systems for handling materials over long distances.

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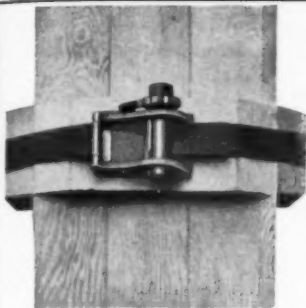
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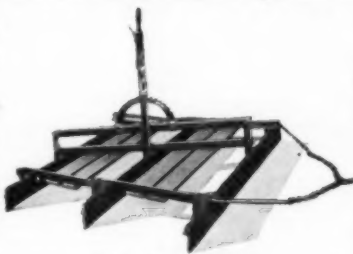
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RUSSELL ROAD EQUIPMENT

Road
Plows

Rooter
Plows

Wheel
Scrap-
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No. 14—Three Blade

Drag
and
Fresno
Scrap-
ers

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No. 30
Catalog

B. W. & LEO HARRIS COMPANY

Minneapolis

MANUFACTURERS

Minn.

**Suitable Serviced Expansion Joints
for every condition—**

HOT — COLD — WET — DRY

WHAT are Serviced Expansion Joints?
—They are premoulded safety strips which protect concrete roads and other concrete structures against cracking and self destruction due to temperature and moisture variations. They are produced from specially refined asphalts to which fibers are added for elasticity and reinforcement, after which they are formed hot under pressure into the required shapes.

WHY use Serviced Expansion Joints?—Because the initial expense is small, and the money saved by their use is considerable. Of what use is it to build a concrete road which will soon crack and require repairs? Serviced Joints are insurance against premature aging and cracking.

TYPE B

Two types are here illustrated: Type "B"—made of special quality asphalt and selected fibers, very low in moisture absorption, and with unusual conformity to expansion and contraction movements together with maximum control of coosing, and our Reinforced Expansion Joint developed for requirements demanding rigidity and strength in fillers, having a core of fiber heavily saturated with high-quality asphalt and reinforced on both sides by sheets of saturated felt.

Write for copy of Catalog No. 11

Telephone: Grove Hill 0423

**SERVICISED PRODUCTS
CORPORATION**

6051 W. 65th Street

Chicago, Ill.

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**CUMMER
ASPHALT PLANTS**

Hot Mix and Cold Mix
Cummer Dryer-Coolers
Cummer Two-Fire Dryers

Portable and Stationary

Mixers—½ ton, ¾ ton, 1 ton, 2 ton

THE F. D. CUMMER & SON CO.

CLEVELAND OHIO

LAUSON

LA-815

1¼-1½-hp.

Air-Cooled

**MANUFACTURERS
JOBBER-DEALERS**

There are 8 sizes of General Purpose Motors from ½ to 1½-hp. Also other Lauson Vertical Engines, from 1½ to 3-hp.; and Horizontal Engines from 1½ to 18-hp. Write for details on the complete Lauson Line.

This Lauson 4-cycle General Purpose Motor is also furnished in the water-cooled type equipped for circulating water, radiator or tank cooler.



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EXPLOSIVES**

The shrewd operator buys explosives from a manufacturer who is constantly working to reduce explosives costs through research and service.

HERCULES POWDER COMPANY
915 KING STREET WILMINGTON, DELAWARE

**SAFETY
ECONOMY
PERFORMANCE**

Oil Burning Construction Equipment

437 Hauck Manufacturing Co., 104-114 Tenth St., Brooklyn, N. Y., will be glad to send on request complete information in regard to its line of oil burning construction equipment, including tar and asphalt melting kettles, concrete mixer heaters, combination asphalt tool and cement heaters, fuel oil burning asphalt surface heaters and asphalt emulsion sprayers for maintenance and concrete-curing emulsions.

Reinforced Concrete Pipe

438 Complete information in regard to Newark reinforced concrete pipe which is easily laid at small expense will be furnished to interested contractors on request by the Newark Concrete Pipe Co., 323 Broadway, Newark, N. J.

Dirt Moving Equipment

439 Complete information in regard to the Blaw-Knox (Ateco) hydraulic scraper which moves heaping loads, grades, excavates, fills and compacts, and the entire line of Blaw-Knox dirt moving equipment may be secured by those interested from the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa.

Hoists and Dump Bodies

440 Wood Hydraulic Hoist & Body Co., 7924 Riopelle St., Detroit, Mich., will be glad to send to those interested a descriptive bulletin giving full information in regard to the line of Wood hoists and dump bodies for all types of dirt moving and dumping jobs.

An Attractive Calendar for 1932

441 Readers of CONTRACTORS AND ENGINEERS MONTHLY who would like to secure the attractive Cletrac 1932 wall calendar illustrated with original photographs may do so without obligation by writing to the Cleveland Tractor Co., 19321 Euclid Ave., Cleveland, Ohio.

A 2-Inch Automatic Priming Pump

442 The Ejectoprim 2-inch automatic priming pump, among the features of which are Timken bearings, a 4-cycle engine, permanent seal, and no packing, is described in literature which the Sterling Machinery Corp., 2303-07 Holmes St., Kansas City, Mo., will be glad to send on request.

Oil Burning Tar and Asphalt Heaters

443 Connery oil burning tar and asphalt heaters as well as the complete line of Connery tar and asphalt equipment are described in the "Blue Book" which Connery & Co., Inc., 4000 No. Second St., Philadelphia, Pa., will be glad to send on request.

Trucks for All Types of Construction Work

444 International trucks in all types and sizes to meet the requirements of all types of construction work are described in a well-illustrated 32-page catalog which the International Harvester Co. of America, 606 So. Michigan Ave., Chicago, Ill., will be glad to send on request.

Handling Large Yardage on Long Hauls

445 A 70-page catalog describing the Sauerman drag scraper, an excavator-conveyor for handling large quantities of dirt on long hauls, may be secured by interested contractors from Sauerman Bros., Inc., 464 So. Clinton St., Chicago, Ill.

Engines for Construction Equipment

446 Continental Motors Corp., Industrial Equipment Division, Muskegon, Mich., will be glad to send to those interested complete information in regard to Continental engines for powering construction equipment, among the features of which are sturdy and reliable construction, stamina and protection by gear-driven force feed lubrication.

A New Size Tractor

447 The new Caterpillar Thirty-Five which has a 37 maximum drawbar horsepower, four forward speeds and is designed to meet the need for a tractor slightly larger than the Thirty is described in literature which the Caterpillar Tractor Co., Peoria, Ill., will be glad to send on request.

An Electrically-Operated Hoist for Cable Drag Scrapers

448 R. H. Beaumont Co., 319 Arch St., Philadelphia, Penna., will be glad to send to those interested literature describing the Beaumont Electro-Auto hoist, an electrically-operated winding machine especially designed for cable drag scraper service.

A Finisher for Metal Shoulders on Highway

449 The Inley Manufacturing Co., Indianapolis, Ind., has announced a new development in the Inley shoulder finishing machine to take care of the new specification for "metal shoulders" along the edge of concrete roads. A complete description of this machine may be secured from the manufacturer.

A New Three-Yard Quarry Shovel

450 Bulletin No. D-1006 recently issued by the Bucyrus-Erie Co., South Milwaukee, Wis., describes this company's 11-B, 3-yard electric or steam, revolving shovel. This 24-page booklet is well illustrated and contains a full mechanical description with complete specifications of this powerful machine for heavy digging.

A New Bituminous Road Mixer

451 Iowa Manufacturing Co., Cedar Rapids, Iowa, will be glad to send to those interested literature describing the Cedar Rapids road-mixer, a machine which picks up the material from a gravel road, batches it accurately, mixes it thoroughly with bitumen and puts it down again as a hard-surfaced dustless and low cost road.

A Super-Corrugated Metal Pipe

452 Multi-Plate pipe, a super-corrugated metal pipe which is made in sections and shipped to a job and assembled in the field, using heavier plates in the invert where the wear comes and lighter plates above, is described in literature which may be secured from Armeo Culvert Manufacturers Assn., Middletown, Ohio.

A Self-Propelled Ditcher with Pneumatic Tires

453 The new Parsons Model 14 ditcher for small pipe lines, mounted on pneumatic tires and able to travel to a job under its own power without restriction on state highways, has been announced by the National Equipment Corp., North 30th St. and West Concordia Ave., Milwaukee, Wis. A complete description and illustration may be secured direct from the manufacturer.

A New Crusher

454 Pioneer Gravel Equipment Mfg. Co., 1515 Central Ave., Minneapolis, Minn., will be glad to send to those interested complete information in regard to the new Pioneer jaw crusher, among the features of which are simplicity of design, sturdy construction, force-feed crushing action and greater capacity.

Road Building and Maintenance Equipment

455 The entire line of Austin-Western road building and maintenance equipment, including tandem and 3-wheel rollers, motor graders, elevating graders, crawler wagons, shovels and cranes, and crushing and screening plants, is described in illustrated catalogs which the Austin-Western Road Machinery Co., 400 No. Michigan Ave., Chicago, Ill., will be glad to send on request.

Unloaders and Spreaders

456 Complete information in regard to Burch unloaders and spreaders for unloading and spreading crushed stone in a speedy and economical manner may be secured by those interested from the Burch Corp., Crestline, Ohio.

A Surfer for Concrete and Concrete-Asphalt Roads

457 A complete description of the Berg Hi-Way surfer for cutting down surface irregularities from concrete and concrete-asphalt highways in a speedy and economical manner may be secured by those interested from the Concrete Surfacing Machinery Co., 4559 Spring Grove Ave., Cincinnati, Ohio.

Explosives for Construction Use

458 The safety, economy and performance of Hercules explosives for construction use is completely described in literature which the Hercules Powder Co., 915 King St., Wilmington, Del., will be glad to send on request.

A Bituminous Pressure Distributor

459 Kinney Manufacturing Co., Boston, Mass., will be glad to send to interested contractors a complete description of the latest type Kinney bituminous pressure distributor which is equipped with the Kinney jacketed pump, meets the modern specification requirements and applies all varieties and grades of bituminous material for road construction and maintenance.

A Complete Bulk Cement Plant

460 Complete information in regard to the Butler bulk cement plant for unloading, storing and proportioning bulk cement, consisting of a storage bin, weighing hopper, bucket elevator and power shovel, may be secured by interested contractors from the Butler Bin Co., Waukesha, Wis.

Road Building Equipment

461 Catalog C. E. describing the complete Lakewood line of road building equipment, including road-pumps, road forms, concrete and asphalt finishing machines, float bridges, batch boxes, subgraders and grade-rollers, and straight-edges may be secured by interested contractors from the Lakewood Engineering Co., Columbus, Ohio.

Pile Drivers and Paving Breakers

462 A 20-page illustrated catalog, Form No. 4364, describing two new I-R pile drivers, the R-63 and the R-30, as well as four sizes of paving breakers, two of which, the 37-pound L-54 and the 80-pound R-63, have recently been added to the I-R line, may be secured by those interested from Ingersoll-Rand Co., 11 Broadway, New York City.

Small Modern 4-Cylinder Engines

463 Complete information regarding the new Hercules IX series of small modern 4-cylinder gasoline engines and power units may be secured from the Hercules Motors Corp., Canton, Ohio.

A Spreader for Road Widening

464 Bulletin No. 121 issued by the Galion Iron Works & Mfg. Co., Galion, Ohio, describes Galion spreaders for asphalt, stone, gravel, slag, etc., and also the special spreader designed for road widening work which makes it possible to spread materials to the side of the old pavement without the trucks leaving the paved surface.

Hoist Lifts Truck Mixer to 8-Foot Height

465 A complete description of the new Jackass hoist designed to increase the distributing area of truck mixers may be secured from the Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis.

A 6-Cylinder Track-Type Tractor

466 The new Allis-Chalmers Model L, 6-cylinder track-type tractor which has six forward speeds and many outstanding features is described in literature which may be secured direct from the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A Self-Propelled Crusher and Screening Unit

467 A new machine for picking up gravel which has been previously washed into a windrow and which elevates, crushes, screens and returns the material to the road as 100 per cent specification material has been developed by the Rogers Iron Works Co., Joplin, Mo., from which company a complete description of this unit may be secured.

Welding and Cutting Equipment

468 The Bastian-Blessing Co., 240 East Ontario St., Chicago, Ill., makers of Rego welding and cutting equipment, has announced a new Catalog No. 57 which is a pocket size booklet of 40 pages indexed for ready reference. Copies of this catalog are available free upon request.

Proportioning Concrete By Weight

469 The Toledo Scale Co., Concrete Aggregate Division, 934 H Street, N. W., Washington, D. C., has issued Bulletins 9902 to 9910 describing the proportioning of concrete by weight using the Toledo method, involving the Determination Auto-Gage and a Compensation Auto-Gage with graphic recording of the weights of all of the ingredients going into each batch weighed and showing the compensation for moisture in three additional ingredients.

Carey Elastite

EXPANSION JOINT

makes Good Paving Better

The "sandwich" joint which protects concrete paving against expansion and contraction stresses. Proved by 20 years' use in highways and sidewalks in all parts of the world. Large stocks in principal cities insure immediate shipment. Write for catalog and 1932 prices.

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GENUINE ACQUA-PRUF FOR BETTER CONCRETE

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IT'S AN ANTI-FREEZE

Acqua-Pruf is a liquid integral for cement and concrete. One quart to the bag produces a compressive strength 25 per cent in excess of untreated concrete.

Acqua-Pruf treated concrete can be poured at temperatures as low as 10 degrees above zero.

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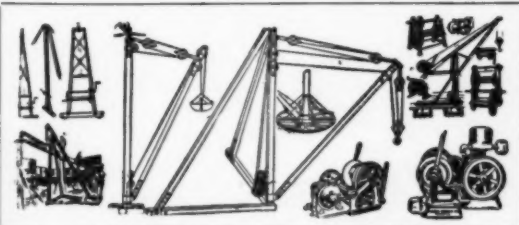
ONE-MAN Schaefer AUTOMATIC Tractor CLEVELAND Scraper

Nearly 10,000 in Use All Over the World

A STURDY BUILT LABOR SAVING UNIT



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SASGEN DERRICK CO.
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D-A LUBRICANT

We'll See You at the ROAD SHOW

Our Space is No. 204



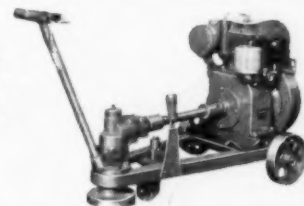
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Always Uniform

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Home Office INDIANAPOLIS Warehouses Everywhere



BERG Machines will be displayed at the Road Show, Detroit, January 11 to 16, inclusive. Be sure to visit our Booth No. 101.



IMPORTANT

savings are assured when you use the BERG Hi-way Surfacers to cut down surface irregularities from concrete and concrete-asphalt highways. Because of the great speed of the cutter plate, larger areas of finished surface are produced quicker and better than by other tools or methods. One man with a BERG can do the work of ten.

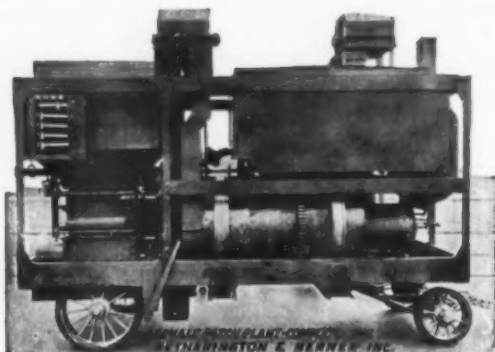
Years of successful operation throughout the country have definitely proved the superiority of the BERG. Used and endorsed by leading contractors, engineers, state and municipal authorities.

Every progressive road builder should include the BERG in his equipment. Complete details mailed on request—write

THE CONCRETE SURFACING MACHINERY CO.
Pioneer Manufacturers of Concrete Surfacing and Metal Cleaning Machines
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BERG

HI-WAY SURFACER



A Real Asphalt Patch Plant

A PORTABLE UNIT WITH A CAPACITY
OF 400 YARDS PER DAY

ACCURATE CONTROL OF MATERIALS
ASSURING ACCURATE MIXTURE TO
COMPLY WITH ANY STANDARD SPECIFICATIONS

Send for Bulletin R-400

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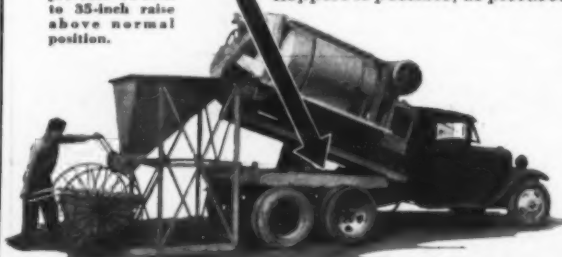
Stationary — Railway — Portable & Semi-Portable Plants

WOOD
HOISTS & BODIES

Jaeger adopts WOOD Hoist for Truck Mixer

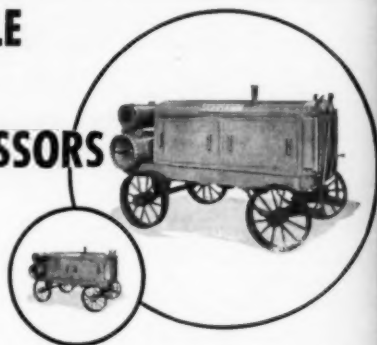
Wood hoists, already most widely used, are given still another job in the contracting field! Jaeger Machine Company found the spouting area of mixers and agitators could be increased 75 per cent by hoisting the rear end. And they picked WOOD for standard equipment. Concrete forms can be filled at distances beyond accessibility of ordinary mixers. Also, discharge into ground hoppers is possible, as pictured.

A 1½-cubic yard Jaeger mounted with Wood F2C hoist on a Ford chassis. Hoist provides 33-inch to 35-inch raise above normal position.



WOOD HYDRAULIC HOIST & BODY CO.
BRANCHES, DISTRIBUTORS IN PRINCIPAL CITIES
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PORTABLE AIR COMPRESSORS



Any size for any job

Eight sizes—36, 72, 120, 180, 240, 360, 540 and 720-cubic foot displacements — each size built of the same SCHRAMM design and equipped with the clutch (except the 36-cubic foot) for easy starting.

SCHRAMM Portable Air Compressors are available in many types of trailer mountings for adaption on any kind of road, construction or street work.

Write for the 1932 catalog describing the latest SCHRAMM features and sizes

SCHRAMM, INC.
West Chester Pa.

Schramm

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5 New

"CHAMPION"

5½-yard

POWER SHOVELS & DRAGLINES

For further particulars, write

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The oscillating front axle on Marion Mules permits an even haul over uneven roads, excavations, or fills. The angle of oscillation causes either front wheel to operate perfectly within a 21-inch vertical movement. . . . Rubber tires can be furnished as regular equipment as well as steel wheels or crawlers. . . . Complete information and prices will be mailed upon request.

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MARION, OHIO

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CONT

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Contractors and Engineers Monthly

DIRECTORY OF EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of the various lines handled. Canadian cards appear on pages 170, 171.

ALABAMA—ARKANSAS

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ROBINS—Belt Conveyors and Screens
ALDRICH—Power Driven Pumps
FOSTER-WHEELER—Pulverized Coal Equipment, Superheaters and Condensers
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SIDNEY Wheelers, Drags, Plows
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OBTON Cranes, Shovels, Draglines
C. H. & E. Saw Rigs, Hoists, Pumps
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LAKEWOOD Mixers, Concrete Placing Equip.
CLEVELAND Rock Drills, Air Tools, Etc.
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DIXON Lubricating Greases
HAISS Loaders and Conveyors
GALION Road Graders and Machinery
PIONEER Screening and Crushing Plants
HYVASS Heavy Duty Trailers
TOLEDO Torches
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ERIE—Bins
JAEGER—Concrete Mixers
ORR & SEMBOWER—Concrete Mixers & Hoists
AMERICAN STEEL & WIRE Co.—"Monitor" Wire Rope
DOMESTIC—Pumps and Hoists
LAKEWOOD—Subgraders, Finishing Machines, Forms, Chuting Equipment and Towers
WYOMING SHOVEL CO.—Red Edge Shovels, Scoops
LINK-BELT CO.—Crawler Cranes, Shovels, Loaders
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BATES—Bar Ties

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McCORMICK-DEERING Industrial Tractors, Engines
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ATLAS Scrapers, Powder Dirt Movers
BAKER Earth Moving Equipment
BAY CITY Shovels, Cranes, Draglines
OED Concrete Finishing Machines
MUNICIPAL Sprinklers, Flushers, etc.
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ATLAS—Rotary Wheel-type Scrapers, Fresnoes
LAKEWOOD—Finishers, Sub-grading, Machinery
BLAW-KNOX—"Pall" Wagon Graders

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ATHEY Truss Wheels
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Structural and Reinforcing Steel and Steel Building Products

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We do, occasionally (try as hard as we can to avoid them). If you find any errors on these pages, will you please notify us so we can correct them?

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MONTHLY**

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Box 2113 Phoenix, Ariz.

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Gorco Spreaders
Huber Road Rollers
Jaeger Concrete Mixers, Pavers, Pumps, Hoists
Jumbo Wheel Scrapers
Lima 101 Shovels
Madsen Portable Paving Plants
Master Rotary Scrapers
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REPUBLIC Concrete Mixers
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GOOD ROADS Crushers & Asphalt Distributors

For Canadian Distributors, see pages 170 and 171

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RED STAR—Wheelbarrows, Concrete Carts
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EUCIID Truss Wheel Dump Wagons, etc.
MIAMI Scrapers and Trailers
DROTT Bulldozers, Scarifiers, Backfillers
KILLEFER Road and Agricultural Tools
SHAW Land Levelers
DAVEY Compressors
WILLAMETTE-ERSTED Hoists
BALL Wagons Graders
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INGERSOLL-RAND Air Compressors and Tools
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FRINK—Snow Plows
HERCULES—Rollers
HUGHES-KEENAN—Iron Mules
McCORMICK-DEERING—Tractors
NELSON—Loaders
NOVO—Pumps and Hoists
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WARCO—Graders and Scoops

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GOHI Culverts
NOVO ENGINE CO.—Gas Engines, Pumps, Hoists
DIAMOND IRON WKS.—Gravel Handling Machinery
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INSLEY—Gasoline Shovels, Cranes and Draglines, Mast Hoists, Chuting Plants and Derricks
PARSONS—Ditchers and Backfillers
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MARLO—Pumps
BLAW-KNOX—Road, Sidewalk, Curb and Gutter Forms, Steel Bins, Batchers, Clamshell Buckets, Etc.
A. W. FRENCH—"ORD" Finishing Machines
METALWELD—Air Compressors and Tools
STERLING Wheelbarrows and Concrete Carts
ALLIS-CHALMERS—Monarch Tractors
AUSTIN-WESTERN—Dirt moving equipment, Graders
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Member: Associated Equipment Distributors

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If you find any errors while checking over this directory will you please advise us at once, because it is our desire to keep it accurate and up-to-date at all times.

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HARNISCHFEGER SALES CORP.—P. & H. Shovels and Draglines
ATECO—Dirtmovers and Scarifiers
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SAUERMAN—Cableways and Power Scrapers
NIAGARA—Vibrating Screens
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GENERAL—Shovels and Cranes

GIERKE-ROBINSON CO.

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CLYDE—Gasoline and Steam Hoists, Derricks
JAEGER—Mixers, Pumps
A. W. FRENCH—Ord. Concrete Road Finishers
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McCORMICK-DEERING—Industrial Tractors
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INSLEY Shovels, Cranes, Draglines, Mast Hoist Plants
C. H. & E. Pumps, Hoists, Saw Rigs
SMITH Mixers
WALTER Snow Fighters
HUGHES-KEENAN Iron Mules
PARSONS Tremblers and Backfillers
B. & G. Lubricants
KWIK-MIX Tub Mixers
HUBER Motor Rollers
NORTHERN Conveyors
TRACKSON Crawler Wagons
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ALLIS-CHALMERS Elevating Graders
GALLION Graders and Motor Patrols
CENTURY & SHAWNEE Pull Type Maintainer
NORTHWEST Shovels and Draglines
MICHIGAN Shovels and Draglines
WARCO Scoops
PERRY Rotary Scrapers
DAVENPORT Cat. Wagons
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SNOW PLOWS

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Thew Shovel Co.
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American Steel & Wire Co.
Austin Machinery Corp.
Butler Bin Co.
Foote Company, Inc.
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WILLIAMS "Arch-Girder" Trailers
WAISS Loaders and Material Handling Equipment
ARMSTRONG Blast Hole Drills
UNION Hammers & Concrete Buckets
HUG Trucks, Turntables and Subgraders
MUNDY Hoisting Engines
VULCAN Locomotives
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HELTZEL Steel Forms
BARNES Pumps
DAVEY Air Cooled Compressors
HARDWOOD Drills
CHICAGO AUTOMATIC Conveyors
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ATHEY Wagons
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 Gulf States Reinforcing Steel
 Hawk Hesters and Thawers
 Johnson Bins and Hoppers
 Lignewood Hoisting Machy.
 Midwest Locomotive
 Link-Belt Portable Conveyors
 Lefel Gas Engines
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 Nove Pumps and Hoists
 Oxweld Apparatus
 Page Buckets
 Rogers Bros. Trailers
 Sagen Derricks
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 Shunk Grader Blades
 Toledo Torches
 Trackson Tractors
 Universal Cons. Accessories
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 Western Road Machinery
 Westinghouse Elec. Motors
 Worthington Pumps
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 American Saw Mill Machinery Co.
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 Wyoming Shovel Works
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 WEHR CO.—Power Road Grades
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 SCHRAMM, INC.—Conveyors
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 JAEGER—Concrete Mixers
 TELSMITH—Sand and Gravel Plants
 DOMESTIC—Pumps, Engines
 ORR & SEMBOWER—Hoisting Engines
 LAKEWOOD—Concrete Chuting
 UNION—File Hammer
 THOR—Compressors and Air Tools
 KOPPEL—Industrial Cars and Trucks
 STANDARD—Hoisting Kettles
 CONTINENTAL—Gas Engines
 CHICAGO—Automatic Material Conveyors
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 IOWA—Pre-Mix Plants, Crushers

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 LE ROI Gas Engines
 LINK-BELT Draglines, Cranes and Shovels
 M & M Form Clamps
 McLEOD Asph. Heaters
 OWEN Clamshell Buckets
 OMAHA Dragline Buckets
 REX Mixers, Pavers, Pumps and Saw Rigs
 SAUERMAN Cableway Excavators
 STERLING Wheelbarrows and Carts
 SULLIVAN Air Tools and Compressors
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 NOVO Hoists
 HUBER Rollers
 ERBE—Clamshell & Dragline Buckets, Aggregators & Plants
 M & M Form Clamps and Shores
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 WOOD Shovels
 MARLOW Pumps
 NORTHERN Conveyors

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 AUSTIN Trenching Machines
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 CLIMAX Engines
 DEAN BROS. Pumps
 DEAN HILL Centrifugal Pumps, Turbines
 ERIE Aggregators, Bins
 HYDROL—Oil Purifiers
 GENERAL ELECTRIC Arc Welders, Motors
 INGERSOLL-RAND Air Compressors, Tools
 KOPPEL Industrial Cars
 MUNDY—Hoists
 MERRELL Pipe Machines
 MORRIS Dredges, Pumps
 NOVO Engines, Hoists, Pumps
 NAGLE Boilers and Engines
 PACIFIC Deep Well Pumps
 PLYMOUTH Locomotives
 STEPHENS-ADAMSON Conveyors, Etc.
 SILENT Hoists and Cranes
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 HELTZEL—Steel Forms, Bins and Batches
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 MORITZ—Shoulder Machines
 BUFFALO—Rollers
 OWEN—Clamshell Buckets
 MUNDY—Hoisting Engines
 WILLIAMSPORT—Wire Rope
 GENERAL—Wheelbarrows, Concrete Carts & Grader Blades
 KALMAN—Center Strip
 NATIONAL—Steel Fabric
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 Gardner-Denver Co.
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 Emerson Pump & Valve Co.
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 Truscon Steel Co.
 McKiernan-Terry Corp.
 Lambert-National Div.
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 CLEVELAND TRACTOR CO.—Tractors
 ELGIN CORP.—Street Sweepers & Educators
 EAGLE TRUCK BODY & MFG. CORP.—Dump Wagons
 UNIVERSAL CRUSHER CO.—Rock Crushers
 STROUD ROAD MACHINERY CO.—Elevating Graders

C. M. CONANT COMPANY

Bangor Maine
Representing
 "CATERPILLAR" Tractors and Graders
 SPEEDER Shovels and Draglines
 SARGENT Snow Plows
 BUHL Compressors
 LaPLANT-CHOATE Bulldozers

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511 W. Pratt St. Baltimore, Md.
Representing
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 The Lakewood Engineering Co.
 Consolidated Concrete Machinery Corp.
 American Cable Company
 Browning Crane and Shovel Co.
 Butler Bin Company
 National Brake & Electric Co.
 Wheeling Corrugating Company
 Good Roads Machinery Company
 Littleford Brothers
 The Foote Company
 Hotchkiss Steel Products Company
 Jones Superior Machine Co.
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628 Munsey Building, Washington, D. C.*Representing*

Blaw-Knox Co.
Boston & Lockport Block Co.
Byers Machine Co.
Chassee Oil Burner Co.
Clyde Iron Works Sales Co.
Connerly & Co., Inc.
Domestic Engine & Pump Co.
E. I. DuPont de Nemours & Co.
Dobbie Foundry & Machine Co.
Duff-Norton Mfg. Co.
Harrington Co.
Huber Mfg. Co.
A. Lecher & Sons Rope Co.
Pulsometer Steam Pump Co.
Ransome Concrete Machs. Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton-Kenly Co., Ltd.
Toluid Framed Steel Co.
Union Iron Works
Universal Road Machy. Co.
Member: Associated Equipment Distributors

HEDGE & MATTHEIS COMPANY285 DORCHESTER AVE. BOSTON, MASS.
Albany, N. Y. Buffalo, N. Y.
Providence, R. I. Boston, Mass. Springfield, Mass.
Portland, Maine New Haven, Conn. Worcester, Mass.*Representing*

American Tubular Elevator Co.
Austin Machinery Corp.
Butler Bin Co.
Jones Superior Mach. Co.
Red Star Corp.
Easton Car & Construction Co.
Hercules Motors Corp.
Homelite Corporation
Ingersoll-Rand Co.
Jaeger Machine Co.
Lakewood Engineering Co.
Dobbie Fdy. & Mach. Co.
Lawrence Pump & Engine Co.
Member: Associated Equipment Distributors

CYRIL J. BURKEGreat Lakes Terminal Warehouse
DETROIT MICHIGAN*Representing*

Lakewood Engineering Co.
Jaeger Machine Co.
General Excavator Co.
Dobbie Foundry & Machine Co.
Hercules Motors Corp.
J. S. Mundy Hoisting Engine Co.
J. M. Willard Co.
Upson-Walton Co.
A. S. Marlow Co.
Whitcomb Locomotive Co.

THE R. D. GRIER & SONS CO.Machine Shop—Iron & Brass Foundry
SALISBURY, Del-Mar-Va Peninsula, MARYLAND*Representing*

Fairbanks, Morse & Co.
Wyoming Shovel Works
Sterling Wheelbarrow Co.
John A. Roebblings' Sons Co.
Crane Co.
National Tube Co.
International Motor Trucks
Goodyear Tire & Rubber Co.
Manhole Frames, Covers & Drain Gates

P. I. PERKINS CO.

376 Dorchester Ave. Boston, Mass.

Representing

"Caterpillar" Tractors
"Caterpillar" Road Machinery
Butler Aggrometer Plants
LaPlant-Choate Bulldozers
Rex Pumps
Pierce Rollers
Byers Cranes & Shovels
Warren Bros. Cement Plants
Rex Mixers, Pavers
Mundy Hoists
Owen Buckets
Schramm Air Compressors

THE EARLE EQUIPMENT CO.

6331-51 Tireman Ave. Detroit, Mich.

Representing

KOEHRING CO.
INSLEY MFG. CO.
T. L. SMITH CO.
THE PARSON CO.
C. H. & E. MFG. CO.
FOUR WHEEL DRIVE CO.
ERIE STEEL CONSTR. CO.
CLEVELAND ROCK DRILL CO.
ACME ROAD MACHY. CO.
SCHRAMM, INC.
BAY CITY FDY. & MACH. CO.
ALLIS-CHALMERS Mower Tractors
LIDGERWOOD Hoists
LE ROI Engines
ROGERS Trailers
LITTLEFORD BROS.
WAUSAU IRON WORKS
D-A LUBRICANT CO.
WATSON SURE GRIP, & SHORE CO.
MAC WHYTE CO.
DIAMOND IRON WORKS
A Complete Line of Small Tools

THE BOND CO.Harold L. Bond, Pres.
DORCHESTER AVE. & SOUTH BOSTON
OLD COLONY AVE. MASSACHUSETTS
Contractors' Tools and Equipment*Representing*

SMITH—Mixers and Pavers
KOEHRING—Cranes, Shovels and Mixers
PARSONS—Trench Machines and Backfillers
INSLEY—Excavators and Concrete Placing Equip.
CHICAGO—Auto. Conveyors
ROGERS—Trailers
HAUCK—Kerosene Heaters
CONNERLY & CO.—Asphalt Kettles
SASGEN—Derricks
JOHNSON Bins and Batches
NOVO—Gasoline Engines, Pumps and Hoists
INGERSOLL-RAND—Air Compressors
Member: Associated Equipment Distributors

H. F. DAVIS TRACTOR CO., Inc.Massachusetts Distributors
Boston Worcester Holyoke*Representing*

Cletrac Tractors
Walsh Snow Plows
Automatic Scrapers
Bulldozers
Road Plows
Saw Rigs

Keller Tractor & Shovel Company, Inc.5124-70 Braden Avenue
Detroit Michigan*Distributors of*

"CATERPILLAR" Tractors, Graders, Combines
KILLEFER Road and Farm Tools
LA PLANT-CHOATE Bulldozers, Backfillers, Wagons, Scrapers
ATECO Hydraulic Scrapers
BAKER MANEY Road Scrapers, Snowplows
WILLAMETTE Hoist for "Caterpillars"
AMERICAN HOIST and DERRICK CO., Gas Shovels, Cranes and Draglines
DETROIT HARVESTER Sweepers and Brushes

CLARK-WILCOX COMPANY

790-798 Albany St. Boston, Mass.

Representing

RANSOME—Concrete Mixers, Chuting Equip.
NORTHWEST—Cranes, Shovels, Draglines
TRUCKTOR—Crawler Trucks
BLAW-KNOX—Steel Forms, Bins, Buckets
ORD—Concrete Road Finishers
FLANNERY MFG. CO.—Detachable Bits
CARTER—"Humdinger" Pumps
INGERSOLL-RAND—Air Compressors
ORB-HEMBOWER—Hoists, Rollers, Mixers
BOOS—Shores and Clamps
HAUCK—Oil Burners and Heaters
HAISS—Elevators, Conveyors and Loaders

M. B. TYLER COMPANY

344 Columbus Ave. Springfield, Mass.

Representing

"CATERPILLAR" Tractors, Road Machinery and Combines (Conn. & Western Mass. Terr.)
KILLEFER Tractor Implements
LA PLANT-CHOATE Trailers and Snow Plows
WILLAMETTE-ERSTED Hoists for "Caterpillars"
W.K.M. Hoists and Rock Crusher for Tractors
DAVEY—Air Cooled Air Compressors
FARQUHAR Boilers and Engines
PIONEER Gravel Equipment, Screens, etc.
HI-WAY SERVICE Snow Plows
DETROIT HARVESTER Mowers and Snow Brushes
EUCLED Scrapers and Wagons
HERCULES Gasoline Rollers
DAY Crushers

R. G. MOELLER COMPANY

14415 Meyers Rd. Detroit, Mich.

Representing

American Tubular Towers
Barnes—Pumps
General—Wheelbarrows, Concrete Carts
Ingersoll-Rand—Compressors, Air Tools
Knickerbocker—Concrete Mixers, Saw Rigs
Laskawana—Steel Sheet Piling
National—Hoisting Engines and Winches
Sagen—Derricks and Winches
Union—Pile Hammers, Mixers, Air Locks
American Steel & Wire—Wire Rope
Wood—Shovels, Picks and Mauls
Dravo—Bottom Dump Buckets
TriLok—Steel Grating
American Marsh—Redi-Prime Pumps
Homestead Valve—High Pressure Janny

THE EQUIPMENT CO.

23-29 Island St. Boston, Mass.

Representing

LINK-BELT Cranes and Shovels
INGERSOLL-RAND Compressors and Tools
CONTINENTAL "Red Seal" Gas Engines
LIDGERWOOD Hoists

WILLIAM FORD TRACTOR SALES COMPANY6405 Schaeffer Road Dearborn, Mich.
Flint—Grand Rapids—Toledo*Representing*

Ford Motor Company
Busher-Gibbs Plow Co.
Purpason-Sherman, Inc.
Roderick-Lean Mfg. Co.
Whitehead & Kales Co.
Detroit Harvester Co.
Stover Mfg. Co.
W. A. Riddell Co.
Wehr Company
Williamette-Ersted Co.
Blount Company
Baldwin Eng. Corp.
Quincy Schaeffer Co.
U. S. Body & Forging Co.
W. M. Blair Mfg. Co.
Trackson Company
Baker Mfg. Co.
Sidney Steel Scraper Co.
Perfection Steel Body Co.
St. Paul Hydraulic Hoist Co.
Kingman Trailer Co.
York-Hoover Body Corp.

O'NEAL TOOL & SUPPLY CO.

5327 Livernois Ave. Detroit, Mich.

Representing

BLYSTONE MFG. CO.—Plaster and Mortar Mixers
CHASE FOUNDRY & MFG. CO.—Industrial Cars
GENERAL WHEELBARROW CO.—"Akron" Wheelbarrows, Concrete Carts, Mortar Boxes, Salamanders, Scrapers, Coal Chutes
STEEL SCAFFOLDING CO.—Adjustable Steel Trusses, Carpenters' Brackets, Ladder Jacks, Mortar Board Stands, etc.
Also
Equipment for Concrete Products Plants, Concrete Mixers, Pumps, Engines, Saw Rigs, Gas and Electric Hoists, Shovels, Air Compressors, etc.

E. K. S. EQUIPMENT CO.

18 Grandville Ave., S.W., Grand Rapids, Mich.

Representing

KOEHRING CO. HUBER Rollers
INSLEY MFG. CO. C. S. JOHNSON CO.
T. L. SMITH CO. BAKER MFG. CO.
PARSONS CO. SCHRAMM, INC.
C. H. & E. MFG. CO. LITTLEFORD BROS.
LIDGERWOOD MFG. CO. STROUD ROAD MA-
CHINERY CO.
MACWHYTE CO. FOUR WHEEL DRIVE
ROME GRADERS TRUCKS
ALLIS-CHALMERS WOOD SHOVEL &
CO. Tractors TOOL CO.
NORTHERN Conveyors

MICHIGAN EQUIPMENT CO.

Pontiac Michigan

Representing

NOVO ENG. CO.—Engines, Hoists, Pumps
INTERNATIONAL HARVESTER CO.—Trac-
tors
REPUBLIC IRON WORKS—Concrete Mixers
BALDWIN TOOL WORKS—Shovels
AMERICAN CABLE CO.—"Tru-Lay" Wire
Rope
SLUSSER-McLEAN SCRAPER CO.—Scrapers
W. P. NELSON IRON WORKS—Loaders
Complete Line Small Tools and Supplies

THORMAN W. RSHOLT CO.

928 So. Fourth St. Minneapolis, Minn.

Representing

JOHNSON Batchers and De-
mountable Bins
RIDDELL Power Grader
TRACKSON Loaders & Crops
TRAILMOBILE Semi- and 4-
Wheel Trailers
VULCAN Steam and Gas Lo-
comotives
LIDGERWOOD Hoists
M. & M. Column Clamps
SARGENT Snow Plows
METAL FORMS CORP.
Steel Forms
OHIO Tractor Dump Wagons
STOCKLAND Graders
WALTER Trucks
Member: Associated Equipment Distributors

HUNTER MACHINERY COMPANY

530 Monroe Ave., N.E. 221 So. Waterman Ave.
Grand Rapids, Mich. Detroit, Mich.

Awell Heaters, Torches
Archer Towers
Bates Wire Ties
Blaw-Knox Blows, Batchers,
Forms, Ready-Mix Con-
crete Plants
Brookville Locomotives
Borch Conveyors, Unloaders,
Stone Spreaders
Chain-Belt Mixers, Pavers
Cleveland Graders, Scrapers
Clyde Hoists, Derricks
Hemlock Pumps
Johnson Fire Pumps
Le Rel Gas Engines
Member: Associated Equipment Distributors

LANGE TRACTOR & EQUIP- MENT COMPANY

304 Lake Ave. S Duluth, Minn.

Representing

Caterpillar Tractor Co.
Killefer Mfg. Corp.
Williamette-Ersted Co.
LaPlant-Choate Mfg. Co.
Wausau Iron Works
Hi-Way Service Corp.
Leach Co.
Davy Compressor Co.
Oshkosh Motors
Diamond Iron Works
Thew Shovel Co.
Blaw-Knox Co.
Cleveland Rock Drill Co.
Tractors & Road Machinery
Road Tools & Farm Implements
Tractor Hoists
Wagons, Bulldozers, Backfillers,
Snow Plows
Bulldozers, Scarifiers
Concrete Mixers
Air Compressors
Four-Wheel Drive Trucks
Gravel Crushing, Screening,
Washing Plants
Shovels
Ateco Dirt-moving Equipment
Air Tools

WM. H. ZIEGLER CO., Inc.

2331 University Ave., S.E. Minneapolis, Minn.
St. Paul and Duluth

Representing

BUCHYRUS-ERIE—Shovels,
Cranes and Draglines
PIONEER—Crushing,
Screening, Washing Plant
REX—Mixers, Pavers, Moto-
mixers, Pumps, Saw Rigs
BUTLER—Bins and Batchers
BARBER-GREENE—Con-
veyors, Loaders, Ditchers
LECHENS—Wire Rope
ARMSTRONG—Blast Hole
Drills
F. W. D.—Four Wheel Drive
Trucks
PLYMOUTH—Locomotives
NORDBERG—Shovels,
Track Machines
GARDNER-DENVER—Air
Compressors, Drills
ARCHER—Towers and Chut-
ing Equipment
LITTLEFORD—Tar Heaters,
Road Equipment
WILLIAMS—Clamshell
Buckets
PAGE—Dragline Buckets
AUSTIN—Backfillers,
Tractors
VULCAN—File Hammers
STERLING—Hoists
MADSEN—Asphalt Plants
STERLING—Wheelbarrows
and Carts

Pingry Tractor & Equipment Co.

1239 Buchanan Ave. Grand Rapids, Mich.

Representing

CATERPILLAR—Tractors, Road Machinery,
Combines
LaPLANT-CHOATE—Bulldozers, Trailers,
Backfillers, Wagons
KILLEFER—Road Rippers
EUCLID—Automatic Scrapers, Wagons
ATHEY—Truss Wheel Wagons, Trailers
PIONEER—Gravel Screening, Crushing and
Washing Equipment
WAUSAU—Snow Plows, Tractor Equipment

H. E. ERICKSON CO., Inc.

247 Second Ave., So. Minneapolis, Minn.

CONTRACTORS' EQUIPMENT AND SUPPLIES

Knickerbocker Concrete
Plaster and Mortar Mixers
Sackett Spouting
Saggen Derricks
Column Clamps
Elite Scaffold Brackets
Novo Engine
Novo Hoists
Novo Pumps
Dragline Buckets
Puffer & Hubbard Wheel-
barrows
Duff Truss Braces
Cement Tools of all kinds
Cement Sack Balers
Steel Dump Bodies
Form Clamps
Tie and Form Wire
Saw Rigs

NORTHFIELD IRON COMPANY

487 Nico St. Northfield, Minn.

ACME Motor Trucks
WISCONSIN Snow Plows
ST. PAUL Dump Bodies,
Hoists
NICO Road Graders, Hose,
etc.
BLIZZARD BUSTER Snow
Fence
INDESTRUCTIBLE Grader,
Conveyor Belts
MODERN Pumps, Generators
SCHRAMM Air Compressors,
Tools
NICO & UNITY Culverts
BLUE DIAMOND STEEL
Cutting Edges
STREICH Wagons
HIWAY Elevating Graders
MASSEY-HARRIS 4-Wb.
Drive Tractors
TOLEDO Torches, Steel
Horses
GROUNDHOG & MASTER
Scrapers
BADGER Crushers, Screening
Plants
LANSING Concrete Mixers
RED & YEL TECO Signs
ROD Truss Scrapers
BUTLER Soft Road Bridging
MASTER Traffic Controls
BLACK Wire Rope & Cable
GENERAL Barrows, Shovels
NEW ENGLAND Loaders
GILBERT Fresno Shoes
CAMEL Crawler Wagons
ADAMS & MODERN Road
Markers

FRED W. LEMCKE

Liberty Street and Park Place
JACKSON MICHIGAN

Representing

KNICKERBOCKER—Concrete Mixers, Saw
Rigs, Mortar and Plaster Mixers
NOVO—Gas Engines, Gas and Electric Hoists,
Pumps and Dragline Equipment
CHAUSSE—Portable Asphalt Plants, Tar Ket-
tles, Tool Heaters, Mixer Heaters, Torches,
Etc.
AMERICAN-MARSH—Centrifugal Pumps (All
sizes and stages)
NORTHERN—Portable and Semi-Portable Con-
veyors for Sand, Gravel and Concrete

GENERAL TRACTOR & EQUIP. CO.

2329 University Ave., S. E., Minneapolis, Minn.

Representing

CATERPILLAR TRACTOR CO.—Tractors and Road Ma-
chinery
KILLEFER MFG. CO.—Road Rippers, Scrapers, Farm Im-
plements
ATHEY TRUSS WHEEL CO.—Crawler Dump Wagons
WILLAMETTE-ERSTED CO.—Power Hoists for Caterpillar
Tractors
HIGHWAY TRAILER CO.—Digging Machines, Scrapers
and Winches
LA PLANT-CHOATE MFG. CO.—Bulldozers, Snow Plows,
Dump Wagons, Backfillers
FRED GETTELMAN CO.—Truck Snow Plows
HI-WAY SERVICE CORP.—Bulldozers, Scarifiers
WAUSAU IRON WORKS—Wausau Snow Plows
LENHART WAGON CO.—Tractor Dump Wagons
BAKER MFG. CO.—Scrapers
MATTSON WIRE & MFG. CO.—Snow Fence
ATECO Scrapers

BORCHERT-INGERSOLL, INC.

St. Paul, Minn. Duluth, Minn.

American Tubular
Towers
Ball Wagon Graders
BB All Steel Hand
Hoists
Blaw-Knox Conc. Forms,
Clamshell Buckets
Clyde Hoists, Derricks
Domestic Pumps
Euclid Crawler Dump
Wagons & Automa-
tomic Scrapers
Gallon Graders
Halsa Loaders
Highway Sanders
Member: Associated Equipment Distributors
Koppel Industrial Cars
McKiernan-Terry Pile
Hammers
Allis-Chalmers Tractors
Northern Conveyors
Northwest Shovels and
Cranes
Nye Steam Pumps
Ord Road Finishers
Ransome Pavers and
Towers
"Snow King" Plows
Stroud Elev. Graders
Whitcomb Gasoline and
Electric Locomotives

Upper Peninsula Tractor Co.

L'Anse Michigan

Representing

"CATERPILLAR" Tractors
"CATERPILLAR" Graders
"CATERPILLAR" Harvesters
ATHEY Truss Wagons
ROTARY Snow Plows
WAUSAU Snow Plows
KILLEFER Road Machinery
PIONEER Gravel Equipment
EUCLID Earth Moving Equipment

MINNEAPOLIS EQUIPMENT CO.

514-520 Second St. S. E. Minneapolis, Minn.

Representing

BRODERICK & BASCOM—KIESLER—Clam Shell Buck-
ets
Wire Rope
LAKEWOOD—Tower Equip.
LE TOURNEAU—Grading
Equipment
MORITZ—Shoukliding Ma-
chines
MULTIFOOTE—Pavers,
Trailers
MUNDY—Hoisting Engines
METALWELD—Worthing-
ton Compressors
NATIONAL—Form Clamps
NELSON—Spreader Ties
OSGOOD—Shovels, Cranes,
Draglines
RED STAR—Carts, Wheel-
barrows
BRODERICK & BASCOM—Wire Rope
CHAUSSE—Asphalt Plants,
Oil Heaters
CLEVELAND—Rock Drills,
Air Tools
DAVENPORT—"Cat Tread"
Wagons
DIAMOND—Gravel Plant
Equipment
FISCHER & HAYES—Con-
crete Form Devices
HOTCHKISS—Steel Forms
HUMPHRIES—Power Pumps
JONES—Superior Saw Rigs
JAEGER—Mixers, Hoists,
Pumps, Truckmixers
KARDONG—Column Clamps

ALFRED MATSON

Willmar Minn.

Representing

DUPLEX MFG. CO.—Motor Graders
GOOD ROADS MACHY—Good Roads Power
Graders, Drawn Graders, Rock Crushing
and Gravel Screening Plants
ROOT SPRING SCRAPER CO.—Big Buster
Snow Plows
HAWKEYE MAINTAINER CO.—Full-type
Road Maintainers Motor Patrols
SHUNK MFG. CO.—Dual Blade Maintainer,
Grader and Snow Plow Blades and Edges
JOHNSTON CULVERT CO.—Toncan Mo-lyb-
denum Corrugated Culverts
CREOSOTED PRODUCTS CO.—Century Creos-
oted Wood Culverts

MISSISSIPPI TRACTOR & EQUIPMENT CO.

301-307 W. Capitol St., Jackson, Miss.

Representing

CATERPILLAR TRACTOR CO.—Tractors and Road Machinery
 WILLAMETTE-ERSTED—Hoists for Caterpillar Tractors
 ALL-STEEL PRODUCTS MFG. CO.—Winches for Caterpillar Tractors
 SPEEDER MACHINERY CORP.—Crane Shovels and Draglines
 TOWERS & SULLIVAN—Tractor Flows
 ATLAS SCRAPER CO.—Rotary Scrapers
 LAPLANTE-CHOATE MFG. CO.—Dump Wagons, Trailers
 LIMA—Shovels, Draglines
 EUCLID ROAD MACHY. CO.—Dump Wagons, Bulldozers

DANIELSON TRACTOR & EQUIP. CO.

2233 Grand Avenue Kansas City, Mo.

Representing

CLEVELAND TRACTOR CO.—Oletrae Tractors
 GENERAL EXCAVATOR CO.—General Shovels
 SCHRAMM, INC.—Air Compressors
 HAWKEYE MAINTAINER CO.—Graders and Maintainers
 N. B. MONROE & SONS—Graders
 SLUSSER-McLEAN SCRAPER CO.—Master Rotary Scrapers
 IOWA MANUFACTURING CO.—Rock Crushers and Gravel Plants
 MAINE STEEL PRODUCTS CO.—Snow Plows
 ATLAS POWDER CO.—Explosives

FICKEISSEN-FINNEY EQUIPMENT COMPANY

4930-32 Southwest Ave., St. Louis, Mo.

Representing

BYERS Shovels and Cranes
 MARSH-CAPRON and WONDER Mixers
 JOHNSON Bins and Batchers
 NOVO Engines, Hoists and Pumps
 HAISS Loaders and Conveyors
 SCHRAMM Compressors and Tools
 Member: Associated Equipment Distributors
 ARCHEE Concrete Tower Equipment
 HOTCHKISS Forms
 PORTO Electric Saws
 FAIGE Dragline Buckets
 MULTIFOOTE Paving Mixers
 ROME Graders
 LESCHEN Wire Rope
 Member: Associated Equipment Distributors

JOHN R. KEY

1313 So. Garrison St., Carthage, Mo.

Representing

LANDRETH MACHINERY CO.
 K-M Grader Patrol
 AMERICAN CEMENT MACHY. CO.
 Mixers
 BARNES MANUFACTURING CO.
 Pumps

FUNKHOUSER EQUIPMENT CO.

2425 Jefferson Street KANSAS CITY MISSOURI

Representing

DIAMOND—Rock Crushers, Gravel Plants
 NORTHWEST—Cranes, Shovels, Draglines
 DOMESTIC—Pumps and Hoists
 RYAN—Graders and Maintainers
 SULLIVAN—Compressors, Drills, Air Hoists
 LIDGERWOOD—Hoists, Gas, Electric, Steam
 AMERICAN—Tubular Towers
 RANSOME—Mixers, Pavers, Tower Equipment
 ERIE—Bins, Aggregators, Buckets
 DOBBIE—Derricks and Derrick Fittings
 PAXSON—Saw Rips
 AMERICAN—Tray Wire Rope
 Member: Associated Equipment Distributors

LAWRENCE V. FRALEY & SON

Buder Building St. Louis

Exclusive Territorial Representatives

Barber-Greene Company
 The Fate-Root-Heath Co.
 Plymouth Locomotives
 Sauerman Bros., Inc.
 Speeder Machinery Corp.
 James B. Seaverns Co.
 Orr & Sembower, Inc.

E. A. MARTIN MACHINERY CO.501-23 School St. Joplin, Mo.
420 W. Commercial St. Springfield, Mo.*Representing*

"CATERPILLAR" Tractors, Road Graders, Combines
 WONDER Concrete Mixers
 MARSH-CAPRON Mixers
 SCHRAMM Air Compressors
 DAY Crushers
 ATHEY Truss Wheel Wagons
 KILLEFER Road Tools
 NOVO Engines, Hoists & Pumps
 CLEVELAND Red Star Barrows & Carts
 BLAKE Type Jaw Crushers
 COENISE Crushing Rolls
 LAPLANT-CHOATE Bulldozers
 LESCHEN Wire Rope
 EUCLID Road Machinery
 STERLING Pumping Units

O. B. AVERY COMPANY

1325 Macklind Ave. St. Louis, Mo.

American Steel & Wire Co.
 American Steel Works
 Buckeye Tractor Ditcher Co.
 Butler Bin Co.
 Black & Decker Co.
 Chain Belt Co.
 Baker Mfg. Co.
 J. I. Case Tractor Co.
 Fairfield Engineering Co.
 Iowa Mfg. Co.
 Koppel Industrial Car and Equip. Co.
 Luedinghaus Wagon Co.
 Domestic Engine & Pump Co.
 National Hoisting Engine Co.
 Northwest Engineering Co.
 Sullivan Machinery Co.
 Wehr Co.
 G. H. Williams Co.
 Wood Shovel & Tool Co.
 Page Engineering Co.
 Toledo Pressed Steel Co.

Member: Associated Equipment Distributors

Lakewood Equipment Co.

1900 North Ninth St. St. Louis, Mo.

*Central 9338**Representing*

LAKEWOOD Paving and Industrial Equipment
 GENERAL Shovels, Skimmers, Cranes, Draglines
 LIMA 101 Shovels, Cranes, Draglines
 HERCULES Rollers
 WORTHINGTON Compressors
 CLEVELAND Pneumatic Tools
 HUMDINGER Pumps
 FAIRBANKS-MORSE Batch Scales
 MORITZ Shoulder Machines
 MUNDY Hoists
 DOBBIE Derricks
 PIONEER Gravel Equipment
 OHIO Tractor Dump Wagons
 SHANKLIN Road Torches

WE WOULD LIKE TO HAVE YOU HELP US

make this Directory of Dealers in construction equipment the most complete and accurate of its kind. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

CORBY SUPPLY COMPANY

3942-46 West Pine Blvd., St. Louis, Mo.

Representing

BOX CRANE & HOIST CORP.—Electric Cranes and Hoists
 BUCKEYE TWIST DRILL CO.—Twist Drills and Reamers
 BUHL CO.—Portable Air Compressors
 CHAMPION RIVET CO.—Rivets and Welding Rod
 DETROIT HOIST & MACHINE CO.—Air Hoists
 HARDOGG WONDER DRILL CO.—Rock Drills, Paving Breakers
 WM. H. KELLER, INC.—Super Pneumatic Tools
 PENNSYLVANIA—Air Compressors and Pumps
 DAVID ROUND & SON—Chain Hoists
 RIVET CUTTING GUN CO.—Rivet Busters
 N. A. STRAND & CO.—Flexible Shaft Equipment
 UNION—Portable Woodworking Tools
 VAN DORN—Electric Drills, Grinders, Buffers
 VICTOR—Welding and Cutting Torches
 WESTINGHOUSE—Arc Welding Equipment
 GUSTAV WIEDEKE & CO.—Tube Expanders

THE LINCOLN EQUIPMENT AND MATERIALS COMPANY

1510 No. 13th St., St. Louis, Mo.

Representing

Allis-Chalmers—Monarch Tractors
 Austin-Western—Graders—Rollers—Crushers
 Ransome—Pavers—Mixers—Towers—Chutes
 Erie—Bins—Aggregators—Clamshell Buckets
 Ingersoll-Rand—Air Compressors and Air Tools
 Keystone—Excavators—Skimmer—Pulley
 Barnes—Pumps—Centrifugal—Plunger and Road Pumps

We Sell or Rent

We Have the Equipment and a Desire to Please

BUBLITZ MACHINERY COMPANY

2141 Washington St., Kansas City, Mo.

Representing

Jaeger Machine Co.
 Lakewood Engineering Co.
 Thew Shovel Co.
 Universal Crane Co.
 McKiernan Terry Corp.
 Worthington Pump & Machy. Co.
 Whitcomb Locomotive Co.
 Butler Bin Co.
 G. H. Williams Co.
 Slusser McLean Scraper Co.
 Foote Co.—Pavers
 Ames-Baldwin-Wyoming Shovel Co.
 Macwhyte Co.
 Red Star Products Co.
 Sagen Derrick Co.

JOHN FABICK TRACTOR CO.

Gravois & Iowa Aves. St. Louis, Mo.

Representing

Caterpillar Tractor Co.
 Euclid Road Machinery Co.
 LaPlant-Choate Mfg. Co.
 American Tractor Equipment Co.
 Baker Mfg. Co.
 Killefer Mfg. Co.
 Willamette-Ersted Co.
 Davey Compressor Co.
 W. K. M. Company

C. F. RABBEIT, INC.

1519-21 N. Broadway St. Louis, Mo.

Representing

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Willamette Iron & Steel Works

Goroco Mechanical Spreader Co.

Luther Manufacturing Co.

Athey Truss Wheel Co.

Baker Manufacturing Co.

Barnes Manufacturing Co.

Gardner-Denver Co.

Chicago Automatic Conveyor Co.

Smith Trailer Corp.

Euclid Road Machinery Co.

Ateco Tamping Rollers

THE KELLAM & SHAFFER CO.

Maxon Road Schenectady, N. Y.

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Trucks

SKELTON—Hand Shovels

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Equipment**SHERMAN & SHEPPARD, INC.**

119 W. 57th St. New York City

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FORDSON TRACTORS AND

EQUIPMENT

UNIT SHOVELS

HAVERSTICK & COMPANY, INC.

Ford and Spring Sts., Rochester, N. Y.

Representing

ORR & SEMBOWER—Mixers, Hoists and Boilers

LANSING CO.—Barrows, Scrapers, Mixers

INGERSOLL-RAND CO.—Portable Air Compressors

AMERICAN STEEL & WIRE CO.—Wire Rope

DOMESTIC ENGINE & PUMP CO.—Pump Rigs

DUFF MFG. CO.—Hydraulic & Screw Jacks

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CONNEAUT SHOVEL CO.

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MULCONROY CO.—Hoses for every purpose

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AEROIL Heaters and Burners

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Car Unloaders**BREWSTER & WILLIAMS, INC.**

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306 S. Salina St. Syracuse, N. Y.

Representing

BUTLER Bins and Measuring Hoppers

DOMESTIC Contractors' Pumps

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HAISS Loaders, Excavators, Conveyors and Buckets

HOTCHKISS Steel Forms

LITTLEFORD Asphalt Heaters and Tools

RANSOME Mixers, Pavers, Towers and Chutes

SULLIVAN Compressors, Drills, and Hoists

THEW Shovels and Cranes

Expansion Joint—Asphalt Emulsions

Mesh and Bar Reinforcement for Pavements

Member: Associated Equipment Distributors

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BROWNING CRANE & SHOVEL CO.—Cranes, Shovels
FAIRFIELD ENGINEERING CO.—Portable Conveyors
INDEPENDENT PNEUMATIC TOOL CO.—Compressors, Tools
LEACH CO.—Concrete Mixers
MACWHYTE CO.—Wire Rope
NOVO ENGINE CO.—Engines, Hoists, Pumps
OWEN BUCKET CO.—Clamshell Buckets
Telephone 2-0043

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33 Eagle Street ASHEVILLE, N. C.
Representing
ATLAS POWDER CO.—Dynamite, Powder, Blasting Supplies
OSGOOD CO.—Crawler Cranes, Shovels, Draglines
KNICKERBOCKER CO.—Revolving Type Mixers
CONSTRUCTION MACHY. CO.—Tilting Drum Mixers
NOVO ENGINE CO.—Gasoline Engines Power and Diaphragm Pumps, Hoists
COLUMBIA ROPE CO.—Tape Marked Manila Rope
BLACK & DECKER MFG. CO.—Portable Elec. Drills and Grinders
AMERICAN SAW MILL MACHY. CO.—Woodworking Machinery
CONCRETE STEEL CO.—Havensley Lath and Fireproofing Materials
METALWELD - WORTHINGTON—Air Compressors
CLEVELAND—Rock Drills

CAROLINA TRACTOR & EQUIPMENT COMPANY
17th & Lee Streets Salisbury, N. C.
Representing
"Caterpillar" Tractors and Graders
"Euclid" Self-Loading Scrapers
"LaPlant-Choate" Bulldozers
"Byers" Shovels & Cranes
"Wonder" & "Marsh-Capron" Mixers and Hoists
"Day" Crushers

MILLER EQUIPMENT CO., Inc.
127 Solar Street SYRACUSE NEW YORK
Representing
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CLEVELAND (Rock Drills)
DOMESTIC
ERIE (Bins)
MEAD-MORRISON
NORTHERN
SCHRAMM
WEHR
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Jaeger Machine Co.
Novo Engine Co.
Koppel Industrial Car & Equip. Co.
Fruehauf Trailer Company
Burton Explosives Inc.
Independent Pneumatic Tool Co.

ELKEN TRACTOR & EQUIPMENT COMPANY
Contractor's Equipment
Minot North Dakota
Representing
"CATERPILLAR" Tractors
"CATERPILLAR" Graders
"CATERPILLAR" Combines
KILLEFER Mfg. Corp.
LA PLANT-CHOATE Mfg. Co.
DIAMOND IRON WORKS, Inc.
DETROIT HARVESTER CO.
AMERICAN Tractor Equip. Co.

SYRACUSE SUPPLY CO.
314 W. Fayette St. Syracuse, N. Y.
Representing
INGERSOLL-RAND—Compressors, Rock Drills, Paving Breakers
KOEHRING—Pavers, Mixers, Shovels, Cranes, Dumpsters
INSLEY—Excavators, Concrete Placing Equipment, Cars, Buckets, Derricks
T.L. SMITH—Pavers, Mixers, Weigh Mix
PARSONS—Ditchers, Backfillers
C. H. & E.—Pumps, Saw Rigs, Hoists, Material Elevators
KWIK MIX—Concrete, Plaster & Mortar Mixers
HELTZEL—Steel Bins, Bulk Cement Plants, Steel Road Forms
BATES—Tractors, Bulldozers
WEHR—Graders
HAZARD—Wire Rope, Lay Set
WILLIAMSPORT—Wire Rope
GOODYEAR—Paver, Steam, Water, Suction and Air Hose
Steel-Iron—Miscellaneous Tools and Supplies
Member: Associated Equipment Distributors

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P. O. Box 1357 CHARLOTTE N. C.
Representing
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Ryan Mfg. Corp.
Fairfield Engineering Co.
Eagle Truck Body & Mfg. Co.
Chicago Pneumatic Tool Co.
The MacWhyte Co.
Toledo Pressed Steel Co.
M & M Wire Clamp Co.
Indianapolis Brush & Broom Co.
Sunbury Mfg. Co.
Homelite Corp.
N. P. Nelson Iron Works
A. D. Joslin Mfg. Co.
Esco Mfg. Co.
Cretney Traffic Guide Co.
Novo Engine Co.
Hercules Motor Co.
Cast Mfg. Co.
Owens Bucket Co.
Lauson Corp.
Ward Plow Co.
Connelly & Co.
The Lansing Co.
Universal Motor Co.
also, Road Rollers, Shovels, Cranes & Draglines

W. K. FIGLEY COMPANY
918 McKinley Ave., S. W. Canton, Ohio
Representing
Jaeger Machine Co.
Cleveland Tractor Co.
Gilbert Manufacturing Co.
DeWalt Products Co.
Connelly & Company
Schramm, Inc.
Sasgen Derrick Co.
American Steel Scraper Co.
Universal Concrete Pipe Co.

ENGELS TRACTOR CO. INC.
Warehouse 334-338 N. Genesee St., Utica New York
Exclusive Distributors
"P & H" Shovels and Equipment
"MONARCH - ALLIS - CHALMERS" Tractors
"F. W. D." Four Wheel Drive Trucks
"CEDAR RAPIDS" CRUSHING-WASHING Equipment
and other leading accounts
Phones 28361, 22312

J. D. WILKINS
West Lee St. Greensboro, N. C.
Representing
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Leach Co.
Ralph B. Carter Co.
Sasgen Derrick Co.
Archer Iron Works
Marion Steam Shovel Co.
Saunders Brothers
Williamport Wire Rope Co.
Jackson Mfg. Co.
Schramm, Incorporated
DeWalt-Wodack Electric Hand Saws
American Mfg. Co. (Shovels)
Union Iron Works, Inc.

WE WOULD LIKE TO HAVE YOU HELP US
make this Directory of Dealers in construction equipment the most complete and accurate of its kind. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.
CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue New York

McQuade & Bannigan, Inc.
829 Noyes St. Utica, N. Y.
Representing
Jaeger Machine Co.
Homelite Corp.
Ingersoll-Rand Co.
Cleveland Wheelbarrow Co.

RALEIGH TRACTOR & EQUIPMENT COMPANY
108 W. Lane St. Raleigh, N. C.
Representing
"Caterpillar" Tractors
Thew Shovel Co.
LaPlant-Choate Mfg. Co.
Euclid Road Machinery Co.
Athey Truss Wheel Co.
Towers & Sullivan Mfg. Co.
Heltzel Steel Form & Iron Wks.
Lakewood Engineering Co.
The C. S. Johnson Co.

THE WM. T. JOHNSTON CO.
"Only Complete Equipment House in Cincinnati"
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Austin Machinery Corp.
Archer Iron Works
Beaumont Mfg. Co.
Binks Mfg. Co.
DeWalt Product Co.
Fischer & Hayes Rope and Steel Co.
Homelite Corp.
Humphreys Mfg. Co.
Knickerbocker Co.
Mall Tool Co.
N. P. Nelson Iron Works
Orr & Sombower, Inc.
Omaha Drag Line Bucket
Oxward Acetylene Co.
Republic Iron Works
Sterling Wheelbarrow Co.
Sasgen Derrick Co.
Schramm, Inc.
Western-Wheeled Scraper Co.
Wood Shovel & Tool Co.
Williamport Wire Rope Co.
Member: Associated Equipment Distributors

H. P. KELLY EQUIPMENT CO.

CINCINNATI, OHIO

4110 Langland St. Kirby 2597

Representing

FOOTE CO.—Multi-Foot Pavers
 GALION IRON WORKS—Road Rollers and Scrapers
 HARNISCHFEGGER CORP.—P & H Shovels, Cranes, Homs, Draglines and Trenchers
 OWEN BUCKET CO.—Clamshell Buckets
 BARNES MFG. CO.—Pumps
 HELTZEL STEEL FORM CO.—Road, Curb and Gutter Forms, Bins and Batches
 FLEXIBLE ROAD JOINT CO.—Flexplane and Cleft Plane
 BROWN HOIST CO.—Hoisting Engines
 MILWAUKEE CRANE & HOIST CO.—Hoist Cranes and Derricks
 SIGNAL SERVICE CORP.—Traffic Signs and Electrical Devices
 COLUMBUS CONVEYOR CO.—Belt and Bucket Conveyors
 Member: Associated Equipment Distributors

THE CUYAHOGA EQUIPMENT CO.

3805 Perkins Ave. Cleveland, Ohio

Representing

McCORMICK-DEERING Industrial Tractors
 W. A. RIDDELL Warco Power Graders
 DETROIT Street Sweeper and Snow Brush
 HUGHES-KEENAN Roustabout Cranes
 CLEVELAND Rock Drill Air Tools
 DAVEY Air Cooled Compressors
 COMPRESSOR Rental Service
 TRACKSON Crawler Tractor, Hoists & Shovels
 BLAIR Hydraulic Diggers
 WARCO Semi Crawlers
 BAY CITY Shovels
 ROTARY Scrapers
 Grader Blades, Scarifiers, Road Drags, Iron Mules, General Planetainers, Lead Clad Culvert Pipe
 'Phone Endicott 1800

INTERSTATE EQUIPMENT SALES CORPORATION

Chester-Twelfth Bldg., Cleveland, O.

Representing

MANITOWOC ENGINEERING WORKS—Speedcranes, Shovels, Draglines, Trenches
 MID-WEST Gas, Gas-Electric and Diesel-Electric Locomotives
 OHIO Locomotive Cranes
 JOS. F. KIESLER—Clam Shell Buckets

THE MECHANICAL SUPPLIES CO.

205-207 Vine St. Cincinnati, Ohio

Representing

LAKEWOOD—Screens, Subgraders, Graders, Road Pumps, etc.
 NOVO—Gasoline Engines, Hoists, Pumps, etc.
 WORTHINGTON—Air Compressors, Rock Drills, Paving Breakers, etc.
 GENERAL—Excavators and Shovels
 JAEGER—Truck Concrete Mixers
 KILLEFER—Road Rippers and Rooters, Road Dies, Scrapers, etc.
 SUPERIOR—Weighing Batches
 NORTHERN—Conveyors, etc.
 JONES-SUPERIOR—Portable Saw Tables, etc.
 COLUMBUS—Elevators and Conveyors
 Member: Associated Equipment Distributors

THE DAY & MADDOCK CO.*Contractors' Equipment*

8201 Almira Ave. Cleveland, O.

Representing

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 Amer.-Terry Derrick Co.
 Knickerbocker Co.
 Blaw-Knox Co.
 Remond Manufacturing Co.
 Sterling Wheelbarrow Co.
 American Hoist & Derrick Co.
 W. Toepfer & Sons
 Northwest Engineering Co.
 A. Lechen & Sons Rope Co.
 Geo. Hales Mfg. Co.
 McKiernan-Terry Corp.
 Milwaukee Locomotive Co.
 Concrete Surf. Machy. Co.
 Universal Crusher Co.
 Sauerman Bros. Inc.
 Barnes Mfg. Co.
 Sullivan Machinery Co.
 Wappat, Inc.
 Sawhill Mfg. Co.

MACKINTOSH ENGINEERING COMPANY*(Construction Equipment)*

2907 Library Ave. Cleveland, O.

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C. S. JOHNSON CO.
 Bins and Weighing Batches
 HARNISCHFEGGER SALES CORP.
 P. & H. Shovels, Cranes and Back Fillers
 NATIONAL BRAKE & ELECTRIC CO.
 Portable Compressors and Tractors
 ATLAS ENGINEERING CO.
 Portable Conveyors

THE PRUES EQUIPMENT CO.

3289 Spring Grove Ave., Cincinnati, O.

Representing

Caterpillar Tractor Co.
 Athey Truss Wheel Co.
 LaPlant-Choate Mfg. Co.
 Killefer Mfg. Co.
 American Tractor & Equip. Co.

Member: Associated Equipment Distributors

HAYES EQUIPMENT CO.*Contractors Equipment*

1404 East 9th St. Cleveland, Ohio

Representing

HUMPHREY Road Pumps
 BROWN Hoists
 SIDNEY Scrapers
 SKELTON Shovels and Scoops
 MACWHYTE Wire Rope
 TOLEDO Torches and Barricades
 DUFF Jacks
 HEWITT Gutta Percha Hose
 STERLING Wheelbarrows
 FIRESTONE Rubber Boots
 EVERHOT Branding Torches

THE W. M. PATTISON SUPPLY CO.

777 Rockwell Ave. Cleveland, Ohio

Representing

American Saw Mill Machy. Co.—Wood Working Machinery
 Domestic Eng. & Pump Co.—Diaphragm and Force Pumps
 Emerson Pump Co.—Emerson Steam Pumps
 Homelite Corp.—Portable Pumps, Generators and Blowers
 Ingersoll-Rand Co.—Air Compressors & Pneumatic Equip.
 Jaeger Machine Co.—Concrete Mixers and Towers
 Littleford Bros.—Asphalt Heaters, Tools and Oil Burners
 Orr & Sombower, Inc.—Electric and Gasoline Hoists, Bolts
 Patent Scaffolding Co.—Scaffold Equipment
 Sagen Derrick Co.—Derricks, Winches
 Gustaf Schneider Co.—Automatic Presses
 Wall Rope Works—High-Grade Manila Rope
 Western Wheelbarrow Co.—Earth Moving Equipment
 Wickwire-Spencer Steel Co.—Wire Rope
 Member: Associated Equipment Distributors

THE QUEEN CITY SUPPLY CO.

Pearl & Elm Sts. Cincinnati, Ohio

Representing

Northwest Engineering Co.—Gasoline Crawler Excavator Equipment
 Chain Belt Co.—Mixers, Pumps and Pavers
 Ingersoll-Rand Co.—Compressors, Pneumatic Tools
 Sauerman Bros. Inc.—Cableway and Power Scraper Excavators
 Clyde Iron Works—Hoisting Engines and Derricks
 G. H. Williams Co.—Clamshell & Dragline Buckets, Heavy Duty Trailers
 American Tubular Elevator Co.—Tubular Elevators
 Wyoming Shovel Co.—"Red Edge" Shovels and Picks
 Sagen Derrick Co.—Derricks

Cincinnati's Largest Equipment House
 Member: Associated Equipment Distributors

HIBBARD-EICHMAN-SMITH, INC.

999 Front St. N. W. Cleveland, Ohio

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 ERIE—Bins, Assemblers, Clamshell Buckets
 GENERAL—Shovels, Cranes, Draglines, Trench Hoes
 SCHRAMM—Air Compressors, Air Tools
 MUNDY—Hoists Dobbie Derricks
 BATES—Tractors
 RELAY & GARFORD—Motor Trucks
 BEAUMONT—Drag Lines
 GOOD ROADS—Crushers
 LINK BELT—Shovels
 STERLING—Wheelbarrows
 ETNYRE—Distributors
 STOCKLAND—Graders
 ARCHER—Towers
 CLEVELAND—Rock Drills
 STERNS—Conveyors
 OWEN—Buckets
 HAUCK—Heaters
 STERLING—Hoists
 HOTCHKISS—Forms
 A complete line of equipment for the Contractor
 Phone Cherry 7070
 SALES — SERVICE — RENTALS

THE POPE EQUIPMENT CO.

Kent Pope, Pres.

4111 Euclid Ave. Cleveland, Ohio

Transportation Engineers

Klauwer Manufacturing Co., Snow-Go
 Pope Salt Spreader and Ice Melter
 Traffic Signals, etc.
 Rebuilt Trailers of All Kinds
 Municipal Equipment
 Storage

CLETRAC OHIO SALES CO.

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Cleveland Ohio

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 Essex Bulldozers
 Sargent Snow Plows
 Schramm Air Compressors

Phone: Kenmore 0300-3697

Industrial Engine Parts, Inc.

1053 E. 61st St. Cleveland, Ohio

Representing

Minneapolis-Moline Power Impl. Co.
 Climax Engineering Co. Twin Disc Clutch Co.
 Fuller & Johnson Mfg. Co.
 Northern Conveyor & Mfg. Co.
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 Portable Power Tool Corp. Hercules Prod. Co.
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 Hastings "Dubi-test" Rings

J. FRANK ROLLINGS*"The Crane Man"*

1337 Schoefield Bldg. Cleveland, Ohio

Representing

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 Thor Air Compressors

W. T. WALSH EQUIPMENT CO.
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Representing
HUBER MFG. CO.—Road Rollers
OHIO POWER SHOVEL CO.—Lima 101 Shovels
DEISTER CONCENTRATOR CO.—Vibrating Screens
GARDNER-DENVER—Compressors
BUTLER BIN CO.—Bins and Batchers
JAMES H. BEANS FDY. CO.—Crushers
G. H. WILLIAMS CO.—Clamshell Buckets
HERCULES MOTORS CORP.—Motors
JAEGER MACHINE CO.—Transit Mixers
LAKEWOOD ENGINEERING CO.—Finishers, Subgraders, Graderooters, Mixers
Phone Lakewood 1024

THE TAYLOR TRACTOR CO.

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Representing
Caterpillar Tractor Company—Tractors, Road Machinery and Harvesters
Harnischfeger Sales Corp.
LaPlant Choate Mfg. Co.
Novo Engine Co.
Athey Truss Wheel Co.
Killefer Manufacturing Corp.
Baker Manufacturing Co.
Euclid Road Machinery Co.
Willamette-Ersted Co.
Blaw-Knox Co. (Ateco Div.)
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E. J. McHARG & CO.
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Keystone Excavators
MultiFoots Road Pavers
Sullivan Portable Compressors and Tools
Barnes Pumps
Telephone 3-5766

MCNEILLY MACHINERY CO.

337 South High St. Columbus, Ohio

Representing
Austin Machinery Corp.—Morotrench Corp.—Wellpoint Trenching Machines, Backfillers, Shovels and Cranes
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Electric, Gasoline Cranes, Shovels and Draglines
Blystone Mfg. Co.
Concrete, Mortar and Plaster Mixers
Dobbs Fdy. & Mash. Co.
Derricks and Fittings
Owen Bucket Co.—Clamshell and Digging Buckets
McKernan-Terry Corp.
Pile Hammers, Jacks, National Hoisting Engines
Sagen Derrick Co.
Derricks, Winches, etc.
Barnes Mfg. Co.
Pumps
Chain Belt Co.
REX Mixers and Pavers
Gardner-Denver Co.
Air Compressors, Tools
Continental Rubber Works—Air Hose, Suction Hose

THE W. W. WILLIAMS CO.

835 West Goodale St. Columbus, Ohio
Dayton Cincinnati

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Insley Manufacturing Co.
T. L. Smith Co.
Parsons Co.
Cleveland Rock Drill Co.
The Sterling Motor Truck Co.
Hug Company
A. W. French & Co.
Blaw-Knox Co.
S. Flory Mfg. Co.
Iowa Mfg. Co.
McCormick-Deering Industrial Tractors
The Buhl Co.

THE BOARDMAN CO.

Oklahoma City Oklahoma

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Monarch and United Tractors with Allied Equipment
EUCLID ROAD MACHINERY CO.
Dump Wagons
ARMCO CULVERT MFG. ASSN.
Armed Ingot Iron Culverts
KILLEFER MFG. CORP.
Revolving Scrapers—Rippers

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Columbus Ohio

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BAY CITY SHOVELS, INC.—Shovels
THE HERCULES CO.—Road Rollers
DOMESTIC ENGINE & PUMP CO.—Pumps
JONES SUPERIOR CO.—Contractors Saws
DeWALT PRODUCTS CORP.—Woodworker Saws
CLEVELAND ROCK DRILL CO.—Pneumatic Tools
HOMELITE CORP.—Portable Generators
ARCHER IRON WORKS—Material Towers
MAC LEOD CO.—Heating Appliances

Ohio Valley Machinery Co.

Marietta Ohio

Representing
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Trackson Co.
Wehr Co.
Hughes-Keenan Co.
Schramm, Inc.
Bay City Shovels, Inc.
W. M. Blair Mfg. Co.
Brookville Locomotive Co.
Muskogee Iron Works
Corley Mfg. Co.
Detroit Harvester Co.
Domestic Engine & Pump Co.
Chain Belt Co.

LOOK THIS DIRECTORY OVER CAREFULLY

If you find any errors while checking over this directory will you please advise us at once, because it is our desire to keep it accurate and up-to-date at all times.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

SMITH & ELLIOTT, INC.

644 North 4th St., Columbus, Ohio

Representing
THE LE BLOND-SCHACHT TRUCK CO.—Motor Trucks
SPEEDER MACHINERY CORP.—Shovels, Cranes and Draglines
METALWELD INCORPORATED—Air Compressors
CLEVELAND ROCK DRILL CO.—Rock Drills, Paving Breakers and Drill Steels
HOMELITE CORPORATION—Portable Centrifugal Pumps, Lighting Plants and Blowers

W. A. KUHLMAN & CO.

Contractors' Equipment
340-342-344 Water Street, TOLEDO, OHIO

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Beach Mfg. Co.
Clyde Iron Works Sales Co.
Concrete Surf. Machy. Co.
Lakewood Engineering Co.
A. Lechen & Sons Rope Co.
Littleford Bros.
Construction Machy. Co.
Erie Steel Construction Co.
Sagen Derrick Co.
Smith Engineering Works
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Jos. F. Kleal Co.
W. A. K. Column Clamps
Bates Mfg. Co.

Member: Associated Equipment Distributors

Leland Equipment Company

Tulsa and Oklahoma City, Oklahoma

Distributors for
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Excavators, Cranes, Trenching Machines and Back-Fillers
INSLEY MFG. CO.—Shovels, Cranes, Backhoes, Concrete Chuting, Towers and Buckets
BLAW-KNOX CO.—Bins, Forms, Buckets
IOWA MFG. CO.—Rock Crushing Plants
SCHRAMM, INC.—Air Compressors, Pneumatic Tools
McCLOSKEY—Trenches
McKERNAN-TERRY CORP.—Pile Hammers, Steam, Electric and Gasoline Hoists
C. H. & E. MFG. CO.—Portable Saw Rigs, Hoists and Pumps, Conveyors Loaders, Wheelbarrows, Tar Kettles
COMPLETE LINE OF TRUCK EQUIPMENT

C. L. STITH COMPANY

305 Franklin Bldg. Columbus, Ohio

Representing
FOOTE CO.—Paving Mixers
GENERAL EXCAVATOR CO.—Shovels, Cranes, Drag Lines, Trench Hoes
HELTZEL STEEL FORM & IRON CO.—Forms, Bins, Batchers Plants
HUBER MFG. CO.—Gasoline Rollers
JAEGER MACHINE CO.—Concrete Mixers, Pumps, Hoists
LAKEWOOD ENGINEERING CO.—Paving, Building and Industrial Equipment
FLEXIBLE ROAD JOINT MACHINE CO.—Compressed Joint Machine
LITTLEFORD BROS.—Tar and Asphalt Kettles
CLEVELAND ROCK DRILL CO.—Rock Drills, Paving Breakers
McCLOSKEY TORCH CO.—Bombshell Trenches
OWEN BUCKET CO.—Clamshell Buckets
SAGEN DERRICK CO.—Derricks, Winches

The National Supply Company

TOLEDO, OHIO

Contractors' Equipment and Supplies

Distributors for
Ingersoll-Rand Co.
Hansome Concrete Machinery Co.
Novo Engine Co.
Byers Machine Co.
Beebe Hand Hoists
Boehling's Wire Rope
Red Edge Shovels
and other high class goods.

MILLER-SANFORD TRACTOR CO.

Eugene — Klamath Falls — Medford
Roseburg
OREGON

Representing
Caterpillar Tractor Co.
Tractors — Graders — Harvesters
American Tractor Equipment Co.
Killefer Manufacturing Co.
Willamette-Ersted Co.
Euclid Road Machy. Co.
LaPlant-Choate Co.

BUNTING TRACTOR COMPANY
LA GRANDE, OREGON*Representing*

Caterpillar Tractor Company
"Caterpillar" Tractors
"Caterpillar" Combines
"Caterpillar" Road Machinery
Athey Truss Wheel Company
LaPlant-Choate Mfg. Company
American Tractor Equipment Co.
Killefer Manufacturing Company
Willamette-Ersted Company
Williamsport Wire Rope Company

J. L. LATTURE EQUIPMENT CO.
312-14 E. Madison St. Portland, Ore.*Representing*

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The Knickerbocker Co.	Le Roi Co.
American Steel Scraper Co.	Moretrench Corp.
Wood Shovel & Tool Co.	Autocar Co.
Union Iron Works	Climax Engineering Co.
Blaw-Knox Co.	The Macleod Co.
Rome Mfg. Co.	Buffalo-Springfield Roller Co.

G. M. STULL COMPANY
Chester Pennsylvania*Representing*

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Universal Power Shovels
Road Machinery
Contractor's Supplies
Diamond Tires

*"Equipment and Supplies for the Fordson"***BALZER MACHINERY COMPANY**
275 Pine Street Portland, Ore.*Representing*

Marion Steam Shovel Co.—Large Power Shovels
Ohio Locomotive Crane Co.—Locomotive Cranes
Gardner-Denver Co.—Air Compressors, Drills, etc.
Wheeling Mold & Foundry Co.—Jaw Rock Crushers
Byers Machine Co.—Small Power Shovels
Niagara Concrete Mixer Co.—Vibrating Screens
Superior Engine Co.—Diesel Engines
S. D. LeClair Co.—Dragline Buckets
Chicago Automatic Conveyor Co.—Conveyors, Loaders, etc.
J. S. Mundy Hoisting Engine Co.—Steam, Gas and Electric Hoists
Ohio Tractor Dump Wagons

**LOGGERS & CONTRACTORS
MACHINERY COMPANY**
345 E. Madison St. Portland, Ore.*Representing*

Caterpillar Tractor Co.
Link Belt Co.
Archer Iron Works
Athey Truss Wheel Co.
LaPlant-Choate Mfg. Co.
Killefer Manufacturing Corp.
Chain Belt Co.
Butler Bin Co.
Speeder Machinery Corp.
Plymouth Locomotive Works
G. H. Williams Co.
Buckeye Traction Ditcher Co.
Willamette-Ersted Co.
American Tractor Equipment Co.
Pioneer Gravel Equipment Mfg. Co.

Barnard Tractor & Equipment Co., Inc.
825 Paxton Street Harrisburg, Pa.*Representing*

CATERPILLAR—Tractors and Road Machinery	BURCH—Stone Spreaders, Castings, Conveyors
LaPLANTE-CHOATE—Wagons, Backfillers, Bulldozers	HIGHWAY—Trailers
BAKER—Maneuvers and Drags	MIAMI—Trailers, Scrapers
RUSSELL—Drags, Scoops	W-K-M—Pipe Handling Equipment
DAVEY—Air Compressors	BLAW-KNOX—Wagon Graders
CLEVELAND—Air Tools	DAY—Crushers
ATHEY—Crawler Wagons	DETROIT—Road and Street Brushes
EUCALID—Crawler Wagons	MILBURN—Carbide Lights, Paint Spray Outlets
WILLIAMETTE—Tractor Hoists and Logging Equip.	WILLIAMS—Clam Shell Buckets
KILLEFER—Agricultural Tools and Scrapers	

CLYDE EQUIPMENT CO.
Contractors' Equipment and Supplies

Portland, Oregon Seattle, Wash.

Atlas Imperial Diesel Eng. Co.	Sterling Wheelbarrow Co.
Clyde Iron Works	Sullivan Machinery Co.
Homelite Corp.	Traylor Engr. & Mfg. Co.
Jaeger Machine Co.	McKiernan-Terry Corp.
Lincoln Electric Co.	Klawer Mfg. Co.
Bucyrus-Erie Co.	Foote Company, Inc.
Geo. Hales Mfg. Co., Inc.	Alto-Chalmers Mfg. Co.
Saunders Brothers	Le Roi Co.
Lakewood Engineering Co.	

Member: Associated Equipment Distributors

McCRAKEN-RIPLEY CO.
61-67 Albina Ave. Portland, Ore.*Representing*

Ransome Concrete Machinery Co.—Mixers, etc.
Atlas Lumnite Cement Co.—Lumnite Cement
Universal Atlas Cement Co.—White Cement
Union Metal Mfg. Co.—Metal Columns
M. & M. Form Clamp Co.—Form Clamps
Blystone Mfg. Co.—Plaster Mixers
Red Star Products Corp.—Red Star Wheelbarrows, Concrete Carts
W. R. Meadows, Inc.—"Seal-Tight" Expansion Joints
Northern Conveyor & Mfg. Co.—Portable Conveyors
Patent Scaffolding Co.—Swinging and Tubular Scaffolds

HERR "THE PUMP MAN"
Lancaster Penna.*Representing*

Gould Pumps, Inc., Pumps
Jaeger Machine Co., Mixers, Hoists
Century Electric Co., Motors
Louden Machinery Co., Barn Equipment
Domestic Engine & Pump Co., Hoists and Compressors and Pumps
Metalweld-Worthington Air Compressors
Wood Working Machinery
Barrows and Cement Tools

FEENAUGHTY MACHINERY CO.
320-338 Belmont St. Portland, Ore.
Spokane — Seattle — Boise*Representing*

American Saw Mill Machinery Co.	Penna. Boiler Works
Chicago Pneumatic Tool Co.	Pickering Governors
Construction Machy. Co.	Sidney Steel Scrapers
Four Wheel Drive Auto Co.	Sterling Wheelbarrows
Galion Iron Works and Mfg. Co.	Thew Shovel Co.
Foote Bros. Gear and Machine Co.	Universal Crane Co.
Lindsford Bros.	Diamond Iron Works
	Birdsell Mfg. Co.
	Avery Power Machinery Co.
	Massey-Harris Co.

Member: Associated Equipment Distributors

MITCHELL, LEWIS & STAYER CO.
330 E. Morrison St. Portland, Ore.*Representing*

ANTHONY CO.—Hydraulic Dump Bodies
SOLANO IRON WORKS—"Pacific" Revolving Tractor Scrapers, Fresno Scrapers
THE NEW WAY MOTOR CO.—Air-Cooled Engines
STOVER MFG. & ENGINE CO.—Gasoline Engines
THE F. E. MYERS & BROTHER CO.—Power Pumps

BOWEN MACHINERY CO.

Excavating—Construction—Industrial EQUIPMENT

1126 N. Delaware Ave. Philadelphia, Pa.

Representing

BYERS MACHINE COMPANY
Shovels, Cranes, Draglines
G. H. WILLIAMS CO.
Clamshell and Dragline Buckets, Heavy Duty Trailers
TAYLOR-WHARTON IRON & STEEL CO.
Manganese Shovel and Bucket Teeth

Howard-Cooper Corporation
Portland — Seattle — Spokane — Twin Falls*Representing*

International Harvester Co. (McCormick-Deering Industrial Tractors)	Orton Crane & Shovel Co.
Austin Machinery Corp.	Rotary Snow Plow Co.
Barber-Greene Co.	Schramm, Inc. (Compressors)
Cleveland Rock Drill Co.	Universal Power Shovel Co.
Ryan Mfg. Corp.	Buda Co. (Diesel & Gas Engines)
Hughes-Kennan Co.	Baker Mfg. Co.
Leach Co.	Walter Motor Truck Co.
Nordberg Mfg. Co. (Symons Crushers)	Ahrens-Fox Fire Engine Co.
	Pacific Goodrich Rubber Co.

Member: Associated Equipment Distributors

Western Road Machinery Co.
220-222 E. Water St. Portland, Ore.*Representing*

SMITH ENGINEERING WORKS—Telmith Crushers
MADSEN IRON WORKS—Portable Asphalt Paving Plants
WORTHINGTON PUMP & MACHINERY CORP.—Worthington Compressors, Worthington-Gillman Air Tools
OHIO POWER SHOVEL CO.—LIMA 1 & 1 1/4 yd. Shovel
HUBER MFG. CO.—Road Rollers
J. D. ADAMS CO.—Adjustable Leaning Wheel Graders
HIGHWAY—Heavy Duty Machinery Trailers
MUNICIPAL SUPPLY CO.—Oil Distributors
GENERAL EXCAVATOR CO.—General Half Yard Shovel
NOVO ENGINE CO.—Engines, Hoists and Pumps

Member: Associated Equipment Distributors

CONTRACTORS EQUIPMENT & SUPPLY CO.

800 No. Delaware Avenue

Philadelphia Pennsylvania

Representing

THE MARION STEAM SHOVEL CO.
Steam, Gas, Gas-Electric
Diesel and Electric
Shovels—Drag Lines—Cranes
AMERICAN STEEL SCRAPER CO.
Wheelbarrows — Scrapers — Road Drags
A. LESCHEN & SONS ROPE CO.
Hercules "Red Strand" Wire Rope
MORSE-STARRETT PRODUCTS CO.
Wire Cable Cutter and Bands

DE HUFF AND HOPKINS

261 N. Broad Street Philadelphia

Representing

SPEEDER MACHINERY CORPORATION
1/2 yd., 3/4 yd. and 1 1/4 yd. full revolving Shovels & Cranes
Motor Truck Cranes

EASTON CAR & CONSTRUCTION CO.
Dump and Flat Cars for Construction Work
Concrete Handling Dump Bodies
Turntables—Portable—Track—Rails, etc.

BROOKVILLE LOCOMOTIVE CO.
Ford and McCormick-Deering Type Gasoline Locomotives

MILWAUKEE LOCOMOTIVE MFG. CO.
Gasoline Locomotives, 4 to 30 tons

Portable Belt Conveyors—Valves and Sluice Gates
Steel Plate Work

HOWARD W. READ CORP.

800 N. Delaware Ave., Philadelphia, Pa.

Distributors

DOMESTIC ENGINE & PUMP CO.—Pumps

HAISS—Buckets

JONES SUPERIOR—Saw Rigs

LINK-BELT—Cranes and Shovels

MEAD-MORRISON—Cranes & Shovels

PENNA. BOILER WORKS—Boilers

AUSTIN-WESTERN ROAD MACHINERY CO.

—Rollers, Graders, etc.

Additional Equipment in Stock:

McKIERNAN-TERRY—Hammers

INGERSOLL-RAND—Compressors

UNIVERSAL—Truck Cranes

ALLEGHENY EQUIPMENT CORP.

Grant Building

Pittsburgh, Pa.

Distributors for

AMERICAN Hoists & Derrick **JACKSON** Concrete Place-

AMERICAN TERRY Derrick

ment Vibrators

"BERG" Highway Surfacers

MICHIGAN 3/4 yd. Shovel

GARDNER-DENVER Com-

NORTH WEST Power Shovels

pressors and Drills

HERCULES Road Rollers

REX Moto-Mixers, Building

Mixers, Pavers and Pumps

Allis-Chalmers Monarch and Ind'U'atral
Tractors and Complete Line of Allied Tractor
Equipment

EDELEN & BOYER COMPANY

Office and Warehouse
236 N. 23rd St.

Philadelphia
Penna.

Distributors for

Lima "M1" Shovel, Crane &

CMC Gasoline Hoists

Trencher

Oliver Platform Trailers

General Shovels, Cranes,

Hayward Clamshell Buckets

Shimmer, Back Hoe

Archier Concrete Towers and

Multi Foote Pavers

Chuting Plants

Flory Hoists

Marsh-Capron Mixers

Freeman Turntables

Marlo Mud and Water Pumps

Holtzel Steel Road Forms

Bay City Truck Cranes

Holtzel Sidewalk & Gutter

Hais Loaders, Unloaders and

Forms, Bins and Batches

Belt Conveyors

Jensen Derricks & Elevators

True-Lay Steel Cable

Wander Mixers and Pumps

Reynolds Constr. Furnaces

Miss Black Machine

Jackson—Wheelbarrows, etc.

Pulometer Steam Pumps

Member: Associated Equipment Distributors

REEVES-McCORMICK, Inc.

5317 N. 2nd St.

Philadelphia

Representing

NOVO—Pumps, Hoists and Engines

FORDSON—Tractors and Accessories

WEHR—Graders

STERLING—Cranes and Tractors

ERIE—Bins and Buckets

CONNERY—Kettles and Asphalt

Heaters

INDEPENDENT "THOR"—Air Com-

pressors

C. H. ARNOLD COMPANY, Inc.

Road and Street Machinery

Contractors' Equipment

726-730 Park Bldg.

Pittsburgh, Penna.

Representing

THE FOOTE COMPANY... Multifoot Paving Mixer

BLAW-KNOX COMPANY... Road and Sidewalk Forms,

Bins, ORD Concrete Road

Finishing Machines

INGERSOLL-RAND CO.... Compressors, Jackhammers,

Paving Breakers

LITTLEFORD BROS.... Tar and Asphalt Heating

Equipment

GENERAL EXCAVATOR CO.... Gas Shovels, Cranes and

Drainages

BARNES MFG. CO.... Force Feed and Diaphragm

Type Pumps

J. D. ADAMS CO.... Earth Moving Equipment

GILES & RANSOME

231-33 No. 12th St., Philadelphia, Pa.

RANSOME CONCRETE MACHINERY CO.—

Concrete Mixers and Appliances

BLAW-KNOX CO.—Clam-shell Buckets, Steel

Forms, Steel Buildings, Steel Bins

RICHMOND SCREW ANCHOR CO.—Concrete

Specialties

THE BARNES MFG. CO.—Centrifugal Dia-

phragm and Force Pumps

NORTHWEST ENGINEERING CO.—Gasoline

Cranes and Shovels

ORD—Road Finishing Machine

CLYDE—Hoisting Engines and Derricks

GARDNER-DENVER—Compressors and Tools

Member: Associated Equipment Distributors



SERVICE SUPPLY CORPORATION

20th and Venango Sts.

PHILADELPHIA, PA.

Chain Belt Co.—Ret Pavers, Mixers, Pumps

Owen Bucket Co.—Clamshell Buckets

Lidgerwood Mfg. Co.—Hoists, Winches, Cableways

Dravo Equipment Co.—American Tubular Towers

Hercules Co.—Road Rollers

Union—Pile Hammers

International Harvester Co.—Industrial Tractors

Allis-Chalmers—Monarch Tractors

Bay City Shovels, Inc.—Shovels, Cranes and Cranes

W. A. Riddell Co.—Graders, Scrapers & Trucks for Tractors

Butler Bin Co.—Bins, all sizes

R. B. Carter—Pumps

Trackson Co.—Crawlers, Shovels and Bulldozers

Chicago Pneumatic Tool Co.—Air Compressors and Tools

Littleford Bros.—Asphalt and Tool Heaters

Member: Associated Equipment Distributors

BECKWITH MACHINERY CO.

6550 Hamilton Ave.

East Liberty

Pittsburgh, Pa.

Representing

"CATERPILLAR" Tractors, Graders and Trac-

tor Equipment

BYRES Shovels and Cranes

DAVEY Air Compressors

CLEVELAND Air Tools

McKIERNAN-TERRY CORP. Pile Hammers

NATIONAL-LAMBERT Hoists, Derricks

NAGLE Boilers

LODER & SHARP, INC.

"Everything for Roads"

32nd Street and Powelton Avenue

PHILADELPHIA, PA.

Representing

F. W. D. Trucks

BATES Tractors

ROME Graders

RELIANCE Crushers

HUBER Rollers

WHEELING Pipe

J. JACOB SHANNON & CO.

1744 — Market Street — 1744

PHILADELPHIA

Representing

Jager Concrete Mixers

Lakewood Road Equipment

Mundy Hoisting Engines

American-Gopher Crawler

Cranes

Red Star Shores & Columns

Clamps

Sagen Derricks & Winches

Berg Concrete Surfaces

Williams Trailers

Jager Pumps

Bates Wire Ties & Tying

Tools

Wyoming "Red Edge" Shov-

els

Jager Truck Mixers

Lakewood Material Towers

Terry Steel Derricks

American Revolver Derricks

Red Star Barrows & Carts

Berg Hi-Way Surfacers

Williams Clam Shell Buckets

Jager Hoists

Multiple Electric Saws

Universal Concrete Acces-

ories

Roebbing Wire Rope

BRINKER SUPPLY COMPANY

6545 Hamilton Ave. (East Liberty) Pittsburgh, Pa.

Contractors' Equipment—Municipal Supplies

Representing

WARCO

HUBER

F. W. D.

LINK-BELT

BATES

BURCH

ROME

SCHRAMM

UNIT

TOWCAN

GOODRICH

CONNERY

McCORMICK-DEERING

—One Man Power Graders

—Motor Road Rollers

—Four-Wheel Drive Trucks

—Shovels, Drag Lines, Cranes

—Steel Mules

—Car Unloaders and Spreaders

—Drawn Road Graders

—Air Compressors

—Gasoline Shovels

—Culvert Pipe

—Fire Hose

—Tar and Heating Kettles

—Tractors and Equipment

—Street Signs and Signals

MAERKY MACHINE WORKS

632 Race Street

Philadelphia

Penna.

Representing

The Climax Engineering Co.

Twin Disc Clutch Co.

Modern Equipment Co.

LEE T. WARD CO., Inc.

2361 E. Tioga St.

Philadelphia

Koehring Co.

Inslay Mfg. Co.

Parsons Co.

T. L. Smith Co.

General Wheelbarrow Co.

C. H. & E. Mfg. Co.

C. S. Johnson Co.

Hotchkiss Steel Form Co.

Universal Form Clamp Co.

National Hoisting Engine Co.

Kwik-Mix Concrete Mixer Co.

National Brake & Electric Co.

H. KLEINHANS COMPANY

Union Trust Bldg.

Pittsburgh, Pa.

Representing

NORTHWEST ENGINEERING CO.—Crawler

Shovels and Cranes

OHIO LOCOMOTIVE CRANE CO.—Locomo-

tive Cranes

G. H. WILLIAMS CO.—Clamshell Buckets

MID-WEST LOCOMOTIVE WORKS—Gasoline

and Diesel-Electric Locomotives

BAY CITY FOUNDRY & MACHINE CO.—

Truck Cranes

A. H. KRIGGER & COMPANY

4 E. Carson St. Pittsburgh, Pa.

Representing

ORTON Cranes and Shovels
BROWN Gasoline Hoists
BEED-PRITCHETT Sawing Machines
BATES Crawler Tractors
STOCKLAND Road Graders
CLIMAX Gasoline Engines & Parts
LE ROI Gasoline Engines & Parts
GROUNDHOG Revolving Scrapers
McCORMICK-DEERING Tractors
IDEAL Power Lawn Mowers
LEE Dump Bodies
ACME Light Road Rollers

ENSMINGER AND COMPANY

181 S. Washington St. Wilkes-Barre, Pa.

Representing

JAEGER Concrete Mixers, Towers, Pumps
LINK-BELT Shovels, Cranes, Backhoes
BAY CITY Tractor Shovels
SCHRAMM, INC. Air Compressors
SOUTH BEND Lathes BUTLER Bins
MUNDY Hoisting Equipment
BLAW KNOX Buckets HUBER Rollers
DOBBIE Derricks and Winches
BURCH Stone Spreaders, Unloaders, Conveyors
NEW HOLLAND Rock Crushers
HIGHWAY SERVICE Chip Spreaders
JACKSON Wheelbarrows and Concrete Carts
AMERICAN Saw Mill Machinery
ADAMS Graders
BEED-PRITCHETT Timber Saws
CLEVELAND Rock Drills, Air Tools
SHUNK MFG. CO.—Tractor Dump Wagons
HOTCHKISS Road Forms

JEFF HUNT ROAD MACHINERY CO.

Columbia So. Carolina

Representing

"CATERPILLAR" Tractors
"CATERPILLAR" Road Machinery
PIONEER Gravel Equipment
AUSTIN Trench Machines
CLYDE Hoists and Derricks
LA-PLANT-CHOATE Dump Wagons
ATHEY Trailers
HERCULES Red Strand Cable
WARD Plows, Roadgraders, Scrapers
WILLAMETTE-ERSTED Hoists
P & H Shovels, Cranes, etc.
ATECO—Scrapers

MARTIN J. O'BRIEN CO., INC.

512 Columbia Bldg.

Pittsburgh, Penna.

Nordberg-Butler Underground Shovels
Standard Gage Track Shifters Narrow Gage
Nordberg Railway Track Equipment
Bay City Tractor Shovels and Cranes
Bay City Full Revolving Shovels up to 1½ yard
Whitcomb Locomotives, Gas, Electric, Diesel
The Ohio Crusher

POWELL-DAVIES TRACTOR AND EQUIPMENT COMPANY, INC.

152 Horton St. Wilkes-Barre, Pa.

Representing

"CATERPILLAR" Tractors and Road Machinery
LA-PLANT-CHOATE Wagons, Bulldozers and Snow Plows
ATHEY TRUSS WHEEL Trailers
EUCLID Wagons and Bulldozers
BAKER-MANEY Wheel and Roll-Over Scrapers
WILLAMETTE-ERSTED Tractor Hoists and Logging Equipment
DAY Crushers
DAVEY Air Compressors
W-K-M Pipe Handling Equipment
KILLEFER Road and Agricultural Tools
UNIT Shovels
DOMESTIC Pumps

Standard Machinery & Equipment Co.

Spartanburg, S. C.

CUMMER Asphalt Plants
BUFFALO-SPRINGFIELD Rollers
BUCHYUS-ERIE Shovels
MULTI-FOOTE Pavers
BUTLER Bins & Hoppers
HUG Truck Dump Bodies
BARBER-GREENE Loaders
GOULD Hand Pumps
HANDY Sack Cleaners, Balers
EASTON Dump Bodies
INGERSOLL-RAND CO. Compressors
LITTLEFORD Asp. Tools
ROME Graders
SHUNK MFG. CO. Blades
FREEMAN Turntables
JAEGER Concrete Mixers
AUSTIN Trenchers
HELTZEL Road Forms
WILLIAMS Buckets
WESTERN Wheeled Scrapers
EAGLE Dump Wagons
DOMESTIC Pumps, Hoists
SASSEN Derricks
DUFF Jacks and Tools
EMERSON Steam Pumps
STERLING Wheelbarrows
WYOMING Shovels
MORROW Screening Plants
ARCHER Concrete Chuting
LIDGERWOOD Hoists
BAKER Backhoes
CARBIC MFG. CO. Lights
WILLIAMSPORT Wire Rope
Members: Associated Equipment Distributors

Pittsburgh Machinery & Equipment Company

Fulton Bldg. Pittsburgh, Pa.

Contractors' Machinery

In Stock at Aspinwall, Pa.

BUCHYUS-ERIE STEAM SHOVELS
BUFFALO-SPRINGFIELD ROAD ROLLERS

Locomotive Cranes
Dinky Locomotives
Hoisting Engines
Concrete Mixers
Pumps, Derricks, Buckets
Rock Crushers

THE CAMERON & BARKLEY CO.

Machinery and Supplies
Contractors' Equipment
CHARLESTON, S. C. JACKSONVILLE, FLA.
TAMPA, FLA. MIAMI, FLA.

*Distributing*

"LINK-BELT" Transmission Materials
"WONDER" Tilted Concrete Mixers
RUMDINGER Power Diaphragm Pumps
C H & E Saw Rigs and Hoists
SCHRAMM Air Compressors
STOVER Gasoline Engines
ROEBLING Wire Rope
WORTHINGTON Pumps
MYERS Pumps

Florida Distributors for Philip Carey Co.'s
Line of Asbestos and Asphalt Products

INTER-STATE EQUIPMENT CO.

1105 S. Main St. Aberdeen, S. Dak.

Representing

"CATERPILLAR" Tractors and Road Machinery
LA-PLANT-CHOATE Tractor Drawn Dump Wagons—Bull Dosers—Snow Plows
EUCLID Rotary Scrapers, Wagons, etc.
KILLEFER Road Tools
ATECO Dirt Movers
DAVEY Compressors
DAY Crushers
WAUSAU Snow Plows
MANHATTAN Belting

GEO. W. ZIEGLER MACHY. CO.

Equipment and Supplies for
ROAD and BUILDING CONTRACTORS
MILLS — MINES — RAILROADS
526 First Avenue Pittsburgh, Pa.

Representing

CLETRAC TRACTORS for Contractors, Industrial Plants and Farmers
"BULLY" Gear Operated Bulldozers, Graders, Brush Cutters and Snow Plows for CLETRAC and "CATERPILLAR" Tractor
JAEGER Tilt and Non-Tilt Concrete Mixers, Pumps (Pressure and Centrifugal) Hoists and Concrete Towers
BUTLER Material Bins and Weighing Batches, any size
F. W. D. AUTO CO. "WAR FAMOUS" Four Wheel Drive Trucks
"THOR" Supercharger Air Compressors
HOMELITE CORP., Centrifugal Portable Pumps and Generators
OSGOOD Gasoline Shovels, Cranes and Drag Lines
SERVICE—STOCK SHIPMENTS—REPAIRS
Member: Associated Equipment Distributors

CAROLINA CONTRACTORS' EQUIPMENT & SUPPLY COMPANY, INC.

P. O. Box 576 Columbia, S. C.

Representing

J. D. Adams Co.
Koschering Co.
T. L. Smith Co.
Insley Mfg. Co.
The Parson Co.
C. H. & E. Mfg. Co.
Metal Lubricant Co.
E. D. Etnyre Co.
Fox Shovels
St. Paul Hydraulic Hoist Co.
Monarch Road Mch. Co.
Sullivan Machinery Co.
Cleveland Wheelbarrow and Manufacturing Co.
Allis-Chalmers Mfg. Co.
Hotchkiss Steel Prod. Co.
McKiernan-Terry Corp.
The Geo. Halsey Mfg. Co.
American Wire Fence Co.
Fulton Bag & Cotton Mills
Trackson Co.
G. H. Williams Co.

EVANS TRACTOR & EQUIPMENT COMPANY

Corner Main St. and Maple Ave.
RAPID CITY SOUTH DAKOTA

Representing

Caterpillar Tractor Co.
Killefer Mfg. Co.
LaPlant-Choate Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Euclid Road Machy. Co.
Indiana Truck Corp.
National Equip. Corp.
Construction Mch. Co.
Wausau Snow Plow Co.
Willamette-Ersted Co.
Athey Truss Wheel Co.
Detroit Harvester Co.

Member: Associated Equipment Distributors

W. J. DOORLEY

Scottdale

Penna.

Representing

Asphalt Equipment Co.
Good Roads Equipment Corp.

"All kinds of Asphalt Equipment"

GIBBS MACHINERY COMPANY

Columbia South Carolina

Representing

CLEVELAND TRACTOR CO.—Tractors
AMERICAN SAW MILL MACHINERY CO.—Woodworking Machinery and Equipment
BAY CITY SHOVELS, INC.—Shovels, Cranes, Draglines and Tractor Shovels
UNION STEAM PUMP CO.—Compressors and Pumps
SKELTON SHOVEL CO.—Shovels and Scoops
TOLEDO PRESSED STEEL CO.—"Toledo" Torches
COLUMBUS IRON WKS. CO.—Grader Blades
MARION STEAM SHOVEL CO.—Shovels, Gas, Electric, Diesel or Steam
DOMESTIC PUMP CO.—Pumps, Road, etc.
ATLAS SCRAPER CO.—Rotary Wheel Scrapers
G. H. WILLIAMS CO.—Buckets and Heavy-Duty Trailers
Also
Road Graders and Rollers, Rollers, Steam and Gasoline Engines

LOOK THIS DIRECTORY OVER CAREFULLY

If you find any errors while checking over this directory will you please advise us at once, because it is our desire to keep it accurate and up to date at all times.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

Central Tractor & Equipment Co. Sioux Falls and Huron, So. Dak.

Representing

"CATERPILLAR" Tractors
"CATERPILLAR" Road Machinery
"CATERPILLAR" Combines
LA PLANT-CHOATE Dump Wagons, Snow
Plows, Bulldozers and Scrapers
KILFEFER Scrapers and Road-Rippers
ATLAS Graders and Scrapers
WAUSAU Tractor and Truck Snow-Plows
ROTARY Snow-Plows and Snow-Loaders
ATEGO Dirt Movers, Bulldozers and Scarifiers

R. L. HARRIS, Inc. 709-15 Cooper St., Knoxville, Tenn.

Representing

"CATERPILLAR" Tractors and Road Ma-
chinery
ATHEY Truss Wheel Wagons
BAKER-MANEY Self Loading Scrapers
BUCYRUS-ERIE Shovels and Cranes
CHICAGO-PNEUMATIC Air Compressors
DOMESTIC Pumps and Hoists
EUCLED Bulldozers
HUBER Road Rollers
HELTZEL Forms, Bins and Batchers
UNIVERSAL Rock Crushers
WILLIAMS Buckets and Trailers

Member: Associated Equipment Distributors

BROWNING-FERRIS MACHY. CO. 205 Exposition Ave. Dallas, Texas Houston—Austin—San Antonio

Representing

Buffalo-Springfield Roller Co. (Dallas & Amarillo)
Barber-Greene Co. (Dallas & Amarillo)
Lakewood Engineering Co.
Sterling Wheelbarrow Co.
Jaeger Machine Company
Heltzel Steel Form & Iron Co.
Ingersoll-Rand Co.
Foote Co.—Pavers
Homelite Corp.—Pumps
Littleford Bros.
Universal Crushers
Thew Shovel Co.
Trackson Co. Crawlers, Hoists
McCormick-Deering Tractors

WESTERN MATERIAL CO. Sioux Falls, S. Dak.

BARNES Pumps
BLACKHAWK Jacks
BLAW-KNOX CO.
BURCH Stone Spreaders
CLEARER Tank Car Heaters
CLYDE Hoists
CONSTRUCTION MA-
CHINERY CO.
DETROIT Mowers
HUBER Road Rollers
INDIANA Trucks
LENHART Wagons
LINK-BELT Shovels
LITTLEFORD BROS.
McLOSKEY Torches
M & M Form Devices
MOSEN Pre-Mixing Plants
NOVO Engines
Member: Associated Equipment Distributors

CHOCTAW CULVERT AND MACHINERY COMPANY

Second & Butler Sts. Memphis, Tenn.

Representing

Jaeger Machine Co.
Sterling Wheelbarrow Co.
Littleford Brothers
Buffalo-Springfield Roller Co.
Lakewood Engineering Co.
The Foote Co.
Owen Bucket Co.
Butler Bin Co.
Beach Mfg. Co.
Northwest Engr'g. Co.

Member: Associated Equipment Distributors

CLARK & BURROWS, Inc. 3600 Commerce St., Dallas, Texas

Representing

KOEHRING—Pavers, Mixers, Power Shovels, Cranes, Drag-
lines, Dumpers
INSLEY—Excavators, Concrete Placing Equipment, Cars,
Buckets, Derricks, Shoulder Finisher
T. L. SMITH—Tilting and Non-Tilting Mixers, Pavers
PARSONS—Trench Excavators, Backfillers, Trailers
C. H. & E.—Portable Saw Rigs, Pumps, Hoists
KWIK-MIX—Mixers; Concrete, Plaster and Mortar
C. S. JOHNSON—Material Storage Bins and Batchers
HERCULES—Rollers, Crawl Tractor Roller
METAL FORMS CORP.—"Metaforms"
CONSOLIDATED IRON-STEEL MFG. CO.—Cleveland
Road Torch
GOOD ROADS—Rock Crushers, Sand and Gravel Plants,
Road Graders
A Complete Line of Construction Equipment

CONNER-CRAVEN EQUIPMENT CO. 612 Chestnut Street Chattanooga Tennessee

Representing

OSGOOD—Diesel, Gas and Electric Shovels, Cranes
CHICAGO PNEUMATIC—Compressors, Air Tools
RANSOME—Pavers, Mixers, Tower and Chuting Equipment
TRUCKTORS—Crawlers for Auto Trucks
ROGERS—Trailers
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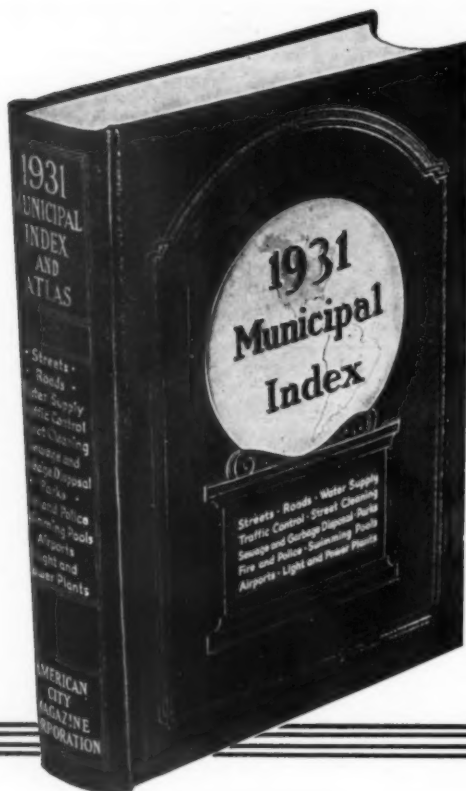
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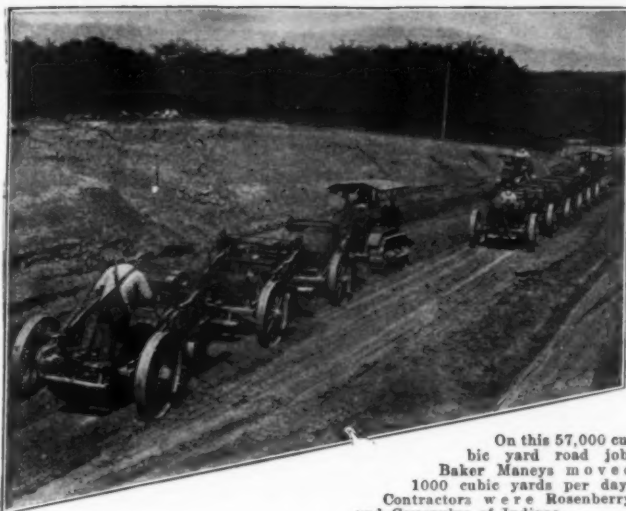
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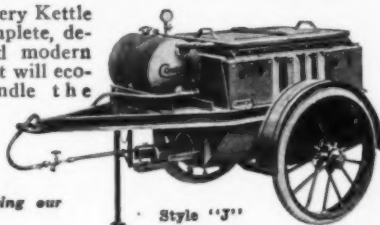
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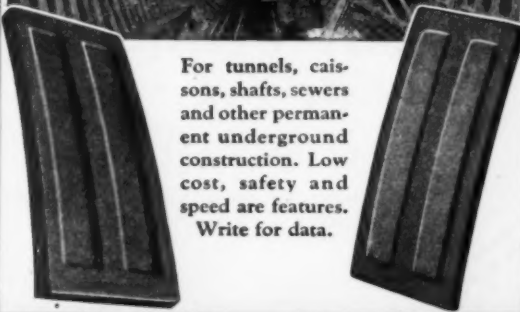
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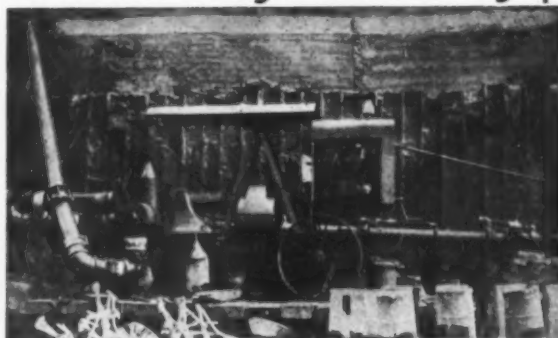
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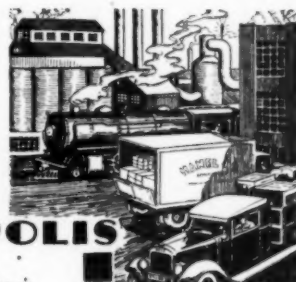
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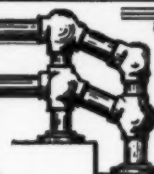
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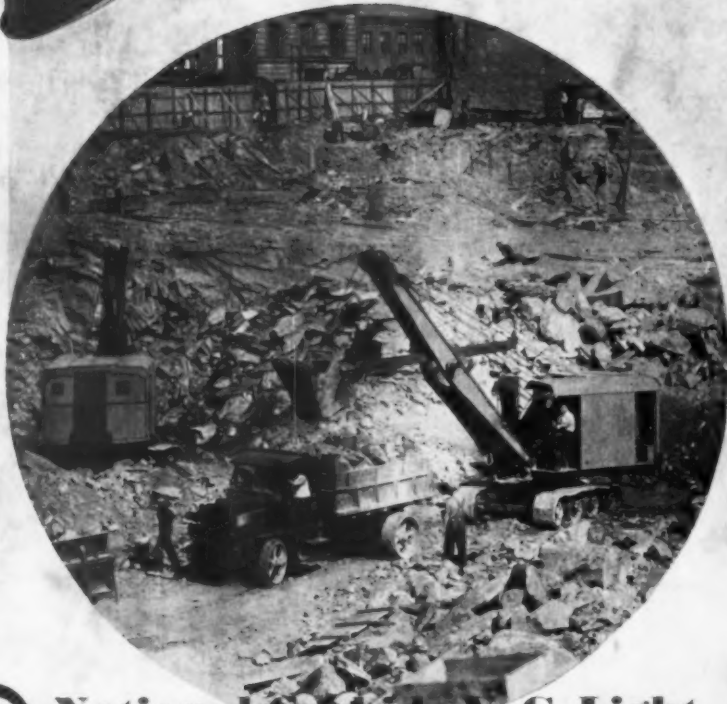
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